The Relationship between the Technology-Organization- Environment (TOE) Framework and Start-up's Performance: The Mediating Role of Digital Marketing Adoption

العلاقة بين إطار عمل التكنولوجيا والتنظيم والبيئة وأداء الشركات الناشئة: الدور الوسيط لتبني التسويق الرقمي

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المستخلص:

الغرض – بالاعتماد على إطار التكنولوجيا والتنظيم والبيئة ، تهدف هذه الدراسة إلى استكشاف العوامل المختلفة التي تؤثر على اعتماد التسويق الرقمي بين الشركات الناشئة في البلدان النامية.

التصميم / المنهجية / النهج – باستخدام الطريقة الكمية ، تم اعتماد تصميم بحث استكشافي في شكل استبيان ، يستهدف ٢٠٥ شركة ناشئة في مصر. لتقييم النموذج المقترح ، نشرت الدراسة نمذجة المعادلة الهيكلية.

النتائج – تشير نتائج هذه الدراسة إلى أن عوامل التكنولوجيا والتنظيم والبيئة لها تأثير كبير على معدل تبني الشركات الجديدة للتسويق الرقمي. علاوة على ذلك ، توفر النتائج مصداقية للنظرية القائلة بأن اعتماد التسويق الرقمي له دور وسيط بين العوامل وأداء الشركات الناشئة.

الأصالة – تعتبر هذه الورقة أول ورقة تقيم تأثير عوامل التكنولوجيا والتنظيم والبيئة على أداء الشركات الناشئة في مصر. بالإضافة إلى ذلك ، ركزت معظم الدراسات التي أجريت حتى الآن إما على تأثير عوامل التكنولوجيا والتنظيم والبيئة على الشركات الصغيرة والمتوسطة أو ركزت على وسائل التواصل الاجتماعي فقط كقناة تقدم هذه الدراسة أسسا للبحث المستقبلي وتوفر العديد من الآثار .تسويق رقمي المترتبة على الممارسين والعلماء المهتمين باعتماد التسويق الرقمي بين الشركات الناشئة

الكلمات المفتاحية: الشركات الناشئة, التسويق الرقمي, تكنولوجي, تنظيمي, بيئي, تبني, أداء

Abstract:

Purpose- Drawing upon the Technology, Organization, and Environment (TOE) framework, this study aims to explore the different factors that impact Digital Marketing Adoption (DMA) among start-ups in developing countries.

Design/Methodology/Approach- Using a quantitative method, an exploratory research design in the form of a questionnaire was adopted, targeting 205 start-up companies in Egypt. To evaluate the proposed model, the study deployed the Structural Equation Modelling (SEM).

Findings- This study's findings indicate that the TOE factors have a significant impact on the rate at which new businesses adopt Digital Marketing (DM). Moreover, the results provide credence to the theory that DMA has a mediating role between the TOE factors and start-ups performance.

Originality- This paper is considered the first to assess the influence of the TOE factors on start-ups performance in Egypt. In addition to that, most of the studies conducted to date either focused on the influence of the TOE factors on Small Medium Enterprises (SMEs) or focused on social media solely as a DM channel. This study offers foundations for future research and provides several implications for practitioners and scholars interested in DMA among start-ups.

Keywords: Start-up Companies, Digital Marketing, Technological, Organizational, Environmental, Adoption, Performance

1. Introduction

In this digital age, businesses are forced to adopt Information and Communication Technologies (ICT) because of their immense impact on productivity and competitiveness (Samsudeen *et al.*, 2021). Digital Marketing (DM) activities have become vital for companies (Hawaldar, *et al.*, 2022; Giantari, *et al.*, 2022) to rapidly attract customers and generate leads (Park *et al.*, 2018).

Moreover, with the technological advancements in DM, challenges evolve every year (Mishra, 2020), and companies started mapping digital footprints to use them for remarketing purposes (Arya *et al.*, 2019).

Digital Marketing Adoption (DMA) is vital for the success of start-ups. DM channels help start-ups construct their brand image and develop strong relationships with their audience by forming strong bonds with members of online communities and giving constant updates on their business activities at a low cost (Patil, *et al.*, 2022). However, small businesses are not adopting DM the same ways as well-established companies and are unaware of their potential benefits (Chakraborti, *et al.*, 2022). Moreover, some owners and managers doubt whether such technologies will yield the returns promised by the advertisers (Ritz, *et al.*, 2019).

Several research have tackled DMA by companies. However, the businesses' competitiveness and productivity vary depending on the type of technology and tool adopted, the size of the organizations, as well as the context of the country (Samsudeen *et al.*, 2021). Few studies have focused on developing countries (Qalati *et al.*, 2020). Moreover, according to literature, there has been a dearth in research studying DMA by start-ups and the reasons behind the use or resistance to use diverse DM channels and technologies (Chakraborti, *et al.*, 2022).

The objective of this research is to fill a gap in the literature and identify the main factors that may be linked to start-ups DMA.

Specifically, the study explains what drives start-ups to use DM and investigates its mediating role between the TOE factors and start-ups performance.

The rest of this paper is organized as follows. Firstly, a review of the literature, the conceptual framework and the research hypotheses are presented, followed by a discussion of the research methodology including the sampling techniques and data collection and measures. After that, the data analysis and main findings are presented, followed by the discussion and implications of the study. The last section presents the limitations and suggestions for future research.

2.Literature Review

Technology-Organization-Environment (TOE) Framework

The conceptual framework proposed in this study is the TOE framework, combined with a few factors from the Diffusion of Innovation Model (DOI). The TOE framework has received consistent empirical support in the Small Medium Enterprises (SMEs) & start-ups context (Abed, 2020; Eze *et al.*, 2021). Therefore, this study employs the TOE framework, arguing that it can comprehensively demonstrate the determinants affecting DMA (Qalati *et al.*, 2022).

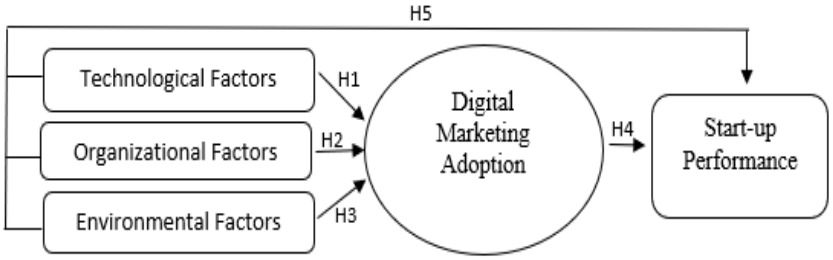

Figure 1: Conceptual Framework

Source: Developed by the Researchers

2.1 Technological Factors (TF)

Four TF were identified in this study as essential in influencing adoption decisions (Shi & Yan, 2016). Firstly, *Perceived Advantage*, which was defined by Rogers (2010) as the potential adopter's assumption that new technology and innovation are better than the existing techniques. Also, Chong and Olesen (2017) stated that perceived advantage has a crucial impact on the adoption of innovation. Secondly, *Compatibility* was defined in the DOI Model as the consistency of the innovation techniques with the previous technologies adopted (Qalati *et al.*, 2021). Thirdly, *Observability* is the ability to monitor the results of adopting an innovation, including how visible these results are to others and to what extent they were beneficiary for them. Finally, *Trialability* refers to the ability to try an innovation tool before its adoption (Ahmad *et al*., 2019).

Even though prior studies that adopted the DOI theory have mainly focused on perceived advantage as constant predecessors of technological adoption (Qalati *et al.*, 2021), and other studies argued that compatibility, trialability, and observability did not have a significant effect in the adoption of technology (Ahmad *et al*., 2019), this study argues that these factors are crucial for

DMA, especially if the benefits are observable and easily transferable via referrals and recommendations (Haridakis & Hanson, 2009), if the business has the ability to unsubscribe from the service with no extra cost (Valenzuela *et al.*, 2009), and if adding a new innovation is aligned with the current strategies of the business. Based on that, the following hypotheses are proposed:

H1a. *Technological Factors have a positive effect on Digital Marketing Adoption.*
H1b. *Technological Factors have a positive effect on start-ups Performance.*

2.2 Organizational Factors (OF)

Tornatzky and Fleisher (2019) stated that OF are the internal characteristics of any firm, whether referring to its size, managerial & financial structure, industry sector, or the level of centralization and formalization. The study examines three OF that are essential in influencing adoption decisions: top management support, entrepreneurial orientation, and internal financial resources.

Top Management Support is crucial for constructing a supportive environment and providing the needed resources for adopting new technologies (Effendi *et al*., 2020). Previous studies assured that top management support is a principal factor in organizational adoption of new technology and that the success of information systems is dependent on the support of the organization's top management, as well as training among SMEs & Start-ups (Ahmad *et al*., 2019; Qalati *et al*., 2021; Ahmad *et al*., 2015; Maduku *et al.*, 2016; Nguyen, 2009; Zhu *et al*., 2003; Zhu *et al*., 2006; Effendi *et al*., 2020; Hwang *et al*., 2012; Matikiti *et al*., 2018).

Entrepreneurial Orientation is a principal asset for start-ups that are competing in electronic environments (Colton *et al*., 2010). It is defined as the organization's capability to recognize, assess, and implement new opportunities entrepreneurially (Fang *et al.*, 2021). Most of the previous studies have examined the relationship between entrepreneurial orientation and organizational performance and showed its necessity for SMEs & start-ups operating in a digital business environment (Sahaym *et al*., 2021).

Internal Financial Resources refers to the start-ups' capital originating from various resources as owners, friends, families, and other externalities, such as financial grants and bank loans (Hasani & O'Reilly, 2021). Most start-ups suffer from the lack of financial resources, which could lead owners to excessively use their personal assets (Hasan & Habib, 2017). Even though this factor is very crucial for any firm, few studies have shown that the internal capabilities are more significant when it comes to developing a competitive advantage for SMEs and start-ups (Maranto & Rangel, 2007). However, other studies showed that financial recourses limitation could be a barrier for improving performance and is considered a critical success factor among start-ups (Davcik & Sharma, 2016; Baidoun *et al*., 2018; Ahmad *et al.,* 2017). Based on that, the following hypotheses are proposed:

H2a. *Organizational Factors have a positive effect on Digital Marketing Adoption.*
H2b. *Organizational Factors have a positive effect on start-ups' Performance.*

2.3 Environmental Factors (EF)

Ramanathan *et al*. (2018) referred to EF as those external factors surrounding the environment in which a business operates and affects its performance. These external factors are categorized

into external supports and external pressures. External supports refer to the assistance received from any third-party outside the company to support in its growth, whereas external pressures refer to all kinds of pressure faced by third parties that limit a company's growth (Hasani & O'Reilly, 2021). In this study, three EF are identified as essential in influencing adoption decisions: external pressure, government support, and the business angel's support.

Many *External Pressures* affect companies; including changing regulations, technology standards, customer requirements, vendor support, globalization, technological development, and rapid diffusion of new technologies (Ahmad *et al.,* 2019; Jang *et al*., 2017). Numerous studies argued that external pressures significantly reduce the company's resources and affect its growth and performance (Hasani & O'Reilly, 2021; Wanger, 2015; Sophonthummapharn, 2009; Grandon & Pearson, 2004; Premkumar, 1994).

Government Support refers to the legislations, policies, initiatives, and governmental entities that have the intention to support new businesses and innovative ideas. Government support has a principal influence in the adoption of new technologies in the TOE framework (Effendi *et al*., 2020). It also significantly impacts investors and customers behaviour, which accordingly affects performance (Li & Cai, 2017). Hence, having appropriate government support, which can provide financial support, resources, and tax breaks, encourages start-ups to adopt innovations and affects their performance.

Another EF that is considered important for the firm to leverage performance is the *Business Angels Support.* Yaokuang *et al.* (2014) stated that Business angels support are those individuals who invest their money, capital, and resources in new businesses and innovative ideas. Moreover, Cox *et al*. (2017) argued that the primary motivators for business angels' investment is the high rate

of return on investment and their personal entrepreneurship interests. Business angels' support can significantly affect performance, by offering a bundle of benefits, such as: reducing financial pressures, developing new skills and experiences, providing a good list of contacts and networking, and enhancing the chance of getting further investments for start-ups (Hasani & O'Reilly, 2021). Based on the above, the following hypotheses are proposed:

H3a. *Environmental Factors have a positive effect on Digital Marketing Adoption.*
H3b. *Environmental Factors have a positive effect on start-ups Performance.*

2.4 The Impact of Digital Marketing Adoption on Performance

DM is considered a recent concept, particularly when it comes to its application to those businesses who cannot make risky investments or have reduced resources (Teixeira *et al.*, 2018; Teixeira *et al.*, 2017),

Some start-ups are facing massive difficulty sustaining their businesses and reaching out to the right customers. These are the start-ups operating on inadequate working capital and lacking the cash needed to promote their business through sponsorships, print or electronic medium. For these start-ups, DM is considered a feasible option since the Return On Ad Spend (ROAS) can be maximized through an optimum budgetary allocation (Sharma *et al.*, 2022; Jain *et al.*, 2021).

According to Ainin *et al*., (2015), companies are adopting different social media platforms because of the impact they have in improving their relationships with customers and information accessibility. Moreover, social media has dramatic effects on companies in the digital world, especially when it comes to

building customer relationships and dealing with customer queries. As mentioned by Rogers (2003) and Ringle *et al*., (2015), social media include social networking sites, photo and video sharing, blogs, forums, online communities, product, or service reviews, etc., which allow companies to create and share user-generated content. Accordingly, Becker *et al*., (2013) argue that SMEs use social media to achieve outstanding performance and enable companies to gain a competitive advantage, since it plays a crucial role in accelerating knowledge sharing among companies and stakeholders.

To date, most of the studies conducted either solely focused on social media or concentrated on the factors affecting the performance of SMEs such as Dadhich & Hiran (2022), Qalati, *et al*., (2022), Oyewobi, *et al.,* (2022), Ma, *et al.,* (2022), Maroufkhani, *et al*., (2022), Alraja, *et al*., (2022), Lutfi, *et al*., (2022), Trawnih, *et al*., (2021), Setiyani & Rostiani (2021), and many others.

However, very limited research has focused on the factors influencing start-ups performance (Hasani and O'Reilly, 2020), even though there are other various types of DM channels that offer affordable and viable options to start-ups who want to market for their products/services and create brand awareness (Chakraborti, *et al.,* 2022). Accordingly, the study hypothesizes the following:

H4. *Digital Marketing Adoption has a positive effect on Startups Performance.*

Many studies measured diverse motivations to comprehend adaptation, use, or gratification of new technologies. The current study focuses on the mediating role of DMA among start-ups. Studies revealed that technology can improve efficiency and streamline business processes (Zieba, *et al.,* 2016; Li *et al.,* 2022). Moreover, researchers revealed that social media adoption has

benefits to organizations and has a positive influence on performance (Braojos-Gomez, *et al*., 2015; Manfreda, *et al*., 2008), sales results (Hair *et al*., 2011), social capital, and significantly affects purchasing decisions (Hair *et al*., 2010).

In a customer-based review study, Hu *et al*. (1999) argued that social media experience mediates between the behavioural intention and motivation of the user. In addition to that, Henseler, *et al*. (2009) found a mediating effect of social media between online service failures and SMEs recovery. Furthermore, in line with Qalati *et al*. (2020) and Henseler, *et al*. (2009), who argue that social media performs a mediating role between the TOE factors and SME performances, this study proposes that DM mediates the relationship between the TOE factors and start-ups performance. Therefore, the current study proposes the following hypothesis:

H5. *Digital Marketing Adoption positively mediates the relationship between the Technology- Organization-Environment (TOE) Factors and start-ups Performance.*

3 Research Methodology

To reach the research objectives and obtain a comprehensive understanding of the topic under investigation, a quantitative research method, in the form of questionnaires, was adopted in this study using a single cross-sectional research design.

Quantitative research was utilized in this study since most of the studies conducted in this field adopted that approach, such as: Samsudeen, *et al*. (2021), Hasani & O'Reilly, (2021), Qalati, *et al*. (2020), Ur Rahman, *et al*. (2020), Pateli, *et al*. (2020), Tripopsakul, (2018), and many others.

The measurement items that were used to operationalize the constructs of the study were gathered from previous literature and

all contributed to answering the hypotheses of the study. The items were measured using a five-point Likert scale (1=" strongly disagree"; 5= "strongly agree"). Measurement items are shown in Table I below.

Table I Measurements of Constructs

Constructs		**Source**
TF	Perceived Advantage	Syed *et al*. (2019), Peltier *et al*. (2013), Moore and Benbasat (1991)
	Compatibility	Qalati, *et al*. (2021)
	Observability	Syed *et al*. (2019), Ramdani *et al*. (2013), Moore and Benbasat (1991)
	Trialability	Wu and Wu (2005), Moore and Benbasat (1991)
OF	Management Support	Syed *et al*. (2019)
	Entrepreneurial Orientation	Dutot and Bergeron (2016), Lin *et al*. (2008)
	Internal Financial Resources	Chuang *et al*. (2013), Grandon and Pearson (2004)
EF	External Pressure	Sophonthummapharn (2009), Grandon and Pearson (2004), Premkumar (1994)
	Governmental Support	Sophonthummapharn (2009)
	Business Angel Support	Hasani and O'Reilly (2020)
DMA		Ainin *et al*. (2015)
Performance		Qalati, *et a*l. (2021)

For pre-testing, a panel study that consisted of two experts was conducted, where a start-up founder and a marketer were given the questionnaire and were asked to give their feedback, according to their areas of expertise. After that, the researchers conducted a pilot study, which consisted of 20 start-ups, to find if there were any unclear expressions and to voice any confusion

about the questionnaire, and avoid deficiencies in the study's design, in preparation for the major study.
A closed-ended questionnaire was used for data collection. Respondents targeted were founders, executives, and managers of start-ups in Egypt since they were considered to be the most well-informed about the start-up's environment and performance. Non-probabilistic sampling was employed to reach start-ups conveniently.

An online survey was conducted on (https://www.googleforms.com). The data collection process lasted for approximately three months. After filtering incomplete responses, a total of 205 valid responses were used for the analysis.

The sample size as recommended by Cochran (1963) is as follows:

$$n = \frac{z^2 * p * (1-p)}{e^2} = \frac{(1.65)^2 * (0.5)(1-0.5)}{0.1^2} \approx 68.0625$$
$$\approx 69 < 205$$

Therefore, the sample needed to exceed 69 respondents to obtain a margin of error of 0.1. To test the proposed hypotheses, the Structural Equation Modelling (SEM) was deployed using Partial-Least-Squares (PLS) software. Jöreskog (1970) explained that SEM is used to define a theoretical causal model, consisting of a set of predicted covariances between variables, and test for plausibility, by comparing with observed data. As suggested by Sarstedt *et al*. (2022), all the below assumptions of SEM were satisfied:

1) The multivariate normality assumption
2) Absence of outliers in data
3) Existence of a large sample size
4) Correct model specifications

4. Results

4.1 Descriptive Statistics

Table II presents the 205 respondents' demographic information, 121 (59 %) were females and 84 (41%) were males. Most respondents 80 (39%) were aged between 31-40 years. The majority had a position of owner 151 (74%), followed by 27 (13%) executive managers, then 11 freelancers (5%) and nine (4%) general managers. The most observed field of industry in the sample was food, beverages and textiles that were 67 start-ups (33%). Other industries such as financial and insurance (8%) and health (9%) presented higher existence in the sample than trade (1%), tourism (1%), agriculture (1%), home organizing (1%), recruitment (1%), marketing and advertising (1%). 115 start-ups (56%) reported that they had less than 5 years of business experience. On the other hand, 62 (30%) start-ups had 5-10 years and 28 (14%) start-ups had more than 10 years.

Most of the sample (61%) depended on themselves in digital management, while 51 (23%) depended on quality staff. 23 (11%) start-ups reported that they depend on the family member's support and 3 (2%) depended on secretaries. Regarding their level of DM utilization, 39% of start-ups utilization was basic, 18% were extensive and 43% were moderate. Concerning DMA, 32% of start-ups adopted DM for less than a year, 40% from 1-2 years, 19% from 3-4 years and 9% adopted it for more than 4 years. Moving to the budget allocated by start-ups for DM, 109 (53%) start-ups allocated from 0-20%, followed by 73 (36%) from 21%-30%, then 14 (7%) from 31-40%, and 9 (4%) allocated more than 40%. Moreover, 140 (68%) start-ups spent less than 5 hours on DM per day, 57 (28%) spent between 5-10 hours, 2 (1%) from 10-15 hours and 6 (3%) spent more than 15 hours per day.

As shown in table II, there were different preferences in the DM channels adopted. Channels such as social media marketing and Search Engine Optimization (SEO) were the most popular channels adopted by start-ups; 194 (95%) and 156 (76%)

respectively. Followed by websites, which were moderately used by start-ups 73 (36%) and represented nearly one third of the total sample. On the other hand, E-marketing, and Search Engine Marketing (SEM) were the least popular channels; 38 (19%) and 24 (12%) respectively.

Table II Descriptives

Variable	Categories	Frequency	Percentages
Gender	Male	84	41%
	Female	121	59%
Age	21-30	78	38%
	31-40	80	39%
	41-50	39	19%
	50+	8	4%
Position	Executive Manager	27	13%
	Financial analyst	4	2%
	Freelancer	11	5%
	General Manager	9	4%
	Owner	151	74%
	Top manager/director	3	2%
Field of Industry	Agriculture	3	1%
	Business Incubators	3	1%
	Construction & Building	5	2%
	Design	6	4%
	E-commerce Automotive	4	2%
	Education, Commerce	12	6%
	Financial and insurance activities	16	8%
	Food & Beverages, Fashion & Textile	67	33%
	Food & Beverages, Handmade work	3	1%
	Handmade work	13	6%
	Health	17	9%
	Home and textile	3	1%
	Home organizing	2	1%
	Industry	8	5%
	Innovation & Entrepreneurship	6	4%
	Interior design services	3	1%
	Lawyer	2	1%
	Luxury Car rental	2	1%
	Marketing & Advertising	4	2%
	Music / media	7	4%
	Pet Manufacturing	3	1%
	Recruitment	2	1%
	Tech/sports	3	1%
	Tourism	3	1%
	Trade	3	1%
	Transportation and storage	5	2%
	5- 10 years	62	30%

Business Experience	**Less than 5 years**	**115**	**56%**
	More than 10 years	**28**	**14%**
Digital Management	**Family Member support**	**23**	**11%**
	Freelanced	**2**	**1%**
	Own self	**126**	**61%**
	Qualified staffs	**51**	**25%**
	Secretary	**3**	**2%**
Email Marketing	**No**	**167**	**81%**
	Yes	**38**	**19%**
SEO	**No**	**49**	**24%**
	Yes	**156**	**76%**
SEM	**No**	**181**	**88%**
	Yes	**24**	**12%**
Website	**No**	**132**	**64%**
	Yes	**73**	**36%**
Social Media Marketing	**No**	**11**	**5%**
	Yes	**194**	**95%**
Level of DM Utilization	**Basic**	**80**	**39%**
	Extensive	**36**	**18%**
	Moderate	**89**	**43%**
Number of years since Adoption	**1-2 years**	**82**	**40%**
	3-4 years	**38**	**19%**
	Less than a year	**66**	**32%**
	More than 4	**19**	**9%**
Staff Hours on DM/ Day	**From 10 to 15 hours**	**2**	**1%**
	From 5 to 10 hours	**57**	**28%**
	Less than 5 hours	**140**	**68%**
	More than 15 hours	**6**	**3%**
Budget Allocated	**0%-20%**	**109**	**53%**
	21%-30%	**73**	**36%**
	31% - 40%	**14**	**7%**
	More than 40%	**9**	**4%**

4.2 Model Analysis

Table III Measurement Model for First and Second Order

	Loading	**Weights**	**CA**	**CR**	**AVE**	**Inner VIF**
TF			0.928	0.938	0.524	3.442
Trialability	0.644	0.227	0.802	0.884	0.718	2.058
Compatibility	0.847	0.31	0.848	0.908	0.766	3.083
Perceived Advantage	0.853	0.379	0.894	0.917	0.612	3.284
Observability	0.83	0.323	0.822	0.877	0.596	3.033
OF			**0.827**	**0.875**	**0.541**	**2.106**
Management Support	0.778	0.534	0.863	0.915	0.782	2.222
Internal Finance Resource	0.553	0.267	0.902	0.919	0.617	1.915
Entrepreneurial Orientation	0.82	0.533	0.772	0.845	0.522	2.444

EF			**0.808**	**0.862**	**0.514**	**2.450**
External Pressure	0.848	0.777	0.808	0.862	0.514	2.691
Governmental Support	0.466	0.216	0.941	0.957	0.849	2.135
Business Angel Support	0.618	0.389	0.88	0.917	0.734	2.208
DMA			0.947	0.953	0.631	**2.648**
Performance			**0.918**	**0.938**	**0.753**	

The study adopted a full collinearity approach, using the Variance Inflation Factor (VIF) for detecting evidence on the Common Method Bias (CMB). However, the computed VIFs were less than 5, which means that CMB was not a key factor (Kock, 2017).

4.3 Evaluation of the Measurement Model

As mentioned previously, the study employed SEM to test the hypothesized model. At first, data were analyzed by assessing the central tendency and dispersion, followed by measuring validity and reliability (Table III). The reliability of the scales was measured using Cronbach's Alpha (CA). Taber (2018) mentioned that CA values should exceed 0.7. After that, the principal component analysis on each item was conducted. Afterwards, convergent validity was projected. According to Nasution *et al.* (2020), internal consistency reliability requires Composite Reliability (CR) to be ≥0.7. Regarding convergent validity, Shrestha (2021) recommended that the Average Variance Extracted (AVE) should be ≥0.5 (Table III). Discriminant validity (Tables IV and V) demonstrates that the square of AVE for each variable exceeded the inter-correlation of the variables, as suggested by Tyagi *et al*. (2022).

Table IV Discriminant Validity for First Order Model

	Business Angel Support	Compatibility	DMA	Entrepreneurial Orientation	External Pressure	Governmental Support	Internal Finance Resource	Management Support	Observability	Perceived Usefulness	Performance	Trialability
Business Angel Support	0.857											
Compatibility	0.282	0.875										
DMA	0.168	0.613	0.794									
Entrepreneurial Orientation	0.032	0.439	0.569	0.723								
External Pressure	0.278	0.611	0.701	0.521	0.717							
Governmental Support	0.629	0.196	0.099	0.240	0.182	0.922						
Internal Finance Resource	0.431	0.262	0.248	0.404	0.335	0.497	0.786					
Management Support	0.300	0.612	0.538	0.493	0.483	0.187	0.311	0.885				
Observability	0.189	0.668	0.649	0.544	0.664	0.114	0.211	0.648	0.772			
Perceived Advantage	0.255	0.747	0.694	0.564	0.652	0.236	0.262	0.506	0.585	0.782		
Performance	0.382	0.534	0.673	0.473	0.560	0.238	0.351	0.491	0.546	0.642	0.868	
Trialability	0.172	0.450	0.478	0.546	0.432	0.113	0.448	0.542	0.566	0.467	0.423	**0.848**

Table V Discriminant Validity for Second Order Model

	DMA	EF	OF	TF	Performance
DMA	0.794				
EF	0.702	0.717			
OF	0.624	0.565	0.736		
TF	0.748	0.734	0.711	0.724	
Performance	0.674	0.562	0.541	0.665	0.868

4.4 Evaluation of the Structural Model

According to Zhang (2022), SEM is a statistical technique that deals with the inquiry and analysis of complex multivariate research data. This paper used PLS bootstrapping with 5000 bootstraps and 205 cases for the demonstration of the results related to paths and their significance level. Table VI presents the comprehensive evaluations from the structural model. Based on criterion (t-value ≥ 1.96 and p-value < 0.05), the results revealed a significant impact of TF on start-ups performance. However, there was not enough evidence to prove the impact of both OF

and EF on performance. At a 95% confidence level, there was also a significant impact of the TOE factors on DMA. In addition to that, there was a significant positive impact of DMA on performance.

In Table VII, the R2 value of 0.62 indicates that 62% of the variation in DMA occurred because of the TOE factors, whereas 51.5% of the variation in performance occurred because of DMA. Moreover, this study employed the cross-validated redundancy measure (Q2) to evaluate the model. According to Al Shamsi *et al*. (2022), Q2 > 0 shows that the model has a predictive relevance. Observing table VII, the model has a considerable predictive relevance for DMA and for performance since it is higher than 0.3.

Table VI Path Coefficient and Hypotheses Testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
DMA -> Performance	0.377	0.372	0.076	4.990	**0.000**	**Supported**
EF -> DMA	0.316	0.315	0.097	3.265	**0.001**	**Supported**
EF -> Performance	0.028	0.027	0.070	0.400	**0.689**	**Rejected**
OF-> DMA	0.158	0.160	0.072	2.190	**0.029**	**Supported**
OF -> Performance	0.065	0.073	0.072	0.905	**0.366**	**Rejected**
TF -> DMA	0.404	0.404	0.113	3.580	**0.000**	**Supported**
TF -> Performance	0.316	0.313	0.081	3.922	**0.000**	**Supported**
Mediating Effect						
EF -> DMA -> Performance	0.119	0.118	0.045	2.630	**0.009**	**Supported**
OF -> DMA -> Performance	0.060	0.059	0.030	1.984	**0.048**	**Supported**
TF -> DMA -> Performance	0.152	0.149	0.049	3.095	**0.002**	**Supported**

Observing the mediation types suggested by MacKinnon *et al*. (2012), DMA was found to be a complete mediator to the relationship between both OF and EF and start-up's performance. However, it was a partial mediator between TF and performance. This is because TF had an impact on DMA, which as a result impacted performance. The SRMR is the root of mean square of residuals and is used to measure the goodness of fit. According to

Ximénez *et al.* (2022), if it is close to zero, the model is considered an excellent fit for data. The SRMR in the study was 0.09, which is a relatively good measure.

Table VII SEM

	SSO	SSE	Q^2	R Square	R Square Adjusted
DMA	2460	1520.119	0.382	0.622	0.617
Performance	1025	640.407	0.375	0.515	0.506

SRMR=0.090, d_ULS=7.600, d_G=5.620, Chi-quare=4602.333, NFI=0.525

5. Discussion

The results of the study indicated that TF, such as perceived advantage, compatibility, observability and trialability, have a positive and significant impact on both start-ups DMA and performance. These findings were aligned with previous studies such as Maduku *et al.* (2016) and Wang *et al.* (2016). New technologies have a massive impact on the performance and development of businesses (Qalati *et al.*, 2021; Valdez-Juárez & Castillo-Vergara, 2021) and technological innovations are necessary to sustain growth and profitability (Kulathunga *et al.*, 2020; D'Attoma & Ieva, 2020).

Findings also revealed that OF, which includes management support, entrepreneurial orientation, and internal financial resources, had a positive and a significant impact on DMA. This was in support with previous studies and was consistent with Pereira *et al.* (2017) who argued that OF, such as size, age, and sector have a significant influence on DMA strategies by SMEs. It was also consistent with Bhagowati and Dutta (2018) who explained that educational orientation of those who are in charge and the managerial support affect organization's DMA. However, unlike a few studies, the findings revealed that OF had an

insignificant impact on performance. The justification of this finding is based on the difference between the nature of start-ups and SMEs, since start-ups are considered faster growing and changing. Moreover, in start-ups, managers do not usually have same level of authority that SMEs have, since innovators and engineers play the most influential role and drive the business.

Results also indicated that EF, such as external pressure, government support and business angel support, had a positive significant impact on DMA. These findings were consistent with Demirci and Audretsch (2020), who found that external EF, such as entrepreneurial ecosystem and government support have a positive impact on DMA by start-ups. On the other hand, unlike the findings of Ali, *et al.* (2020) that argued that EF, such as industry structure, regulatory systems and suppliers had a significant effect on performance, EF had an insignificant impact on performance in this study. However, according to Asad and Ali (2020), Adel, *et al.* (2020) & Basri and Siam (2019), some businesses use strategic approaches in their environmental practices for the purpose of creating a competitive advantage. Such strategic approaches have mitigated the risks (such as competition, the government, employee problems, and public outrage) that are associated with environmental performance.

Findings revealed that start-ups' DMA had a significant impact on performance, which was in line with other studies such as Qalati *et al.* (2021) and Ahmad *et al.* (2019). Moreover, Basri and Siam (2019) argued that in the modern digital world, youth and new businesses have constant access to the internet and use various social media tools. The interactive nature of social media adoption is a vital factor that enables SMEs to have a two-way communication with their customers and business partners, which encourages its adoption. Moreover, a study by Tornikoski and Newell (2015) found that DMA positively affects SMEs' performance. DM has many channels that helps in increasing the business's popularity and customer interaction.

Similarly, the study found that DMA played a mediating role in the relationship between the TOE factors and performance. These results were consistent with Freixanet, *et al.* (2020), Bagheri, *et al.* (2019), Reid-Griffin, and Carter (2004), Lertwongsatien and Wongpinunwatana (2003), Henseler, *et al.* (2009) who argued that social media performs a mediating role between the TOE and SMEs performances. In this study, the DMA was the mediator for the relationship between the TOE factors and start-up performance.

Overall, the study highlights the importance of DMA for start-ups success and identifies key factors that influence adoption decisions. Business owners and managers seeking to enhance their performance via DM should be aware of the TOE factors that affect DMA to increase their acceptance and usage of DM technologies.

6. Implications

This study fills a gap in the literature by focusing on the factors influencing DMA by start-ups in Egypt. It also contributes to the scientific understanding of DM and provides implications that can be useful for academics, entrepreneurs, business owners, and managers. Furthermore, this study can help start-ups recognize the aspects that affect DMA, which can allow them to overcome problems and flourish.

6.1 Theoretical Contribution

The study's findings expand the existing literature on the impact of technology adoption on start-up companies' performance in developing countries. Specifically, the research highlights the role of DMA as a mediator in the link between TOE variables and start-up's success. The study focuses on Egypt as an emerging economy and sheds light on the under-researched area of the factors that affect DMA among start-ups.

Previous studies have either investigated the variables individually or in other dimensions (Abed, 2020; Olanrewaju, *et*

al., 2020; Ainin *et al.,* 2015) or suggested further empirical investigation with regards to theory validation and building. However, this study provides a parsimonious and relevant method for examining the research phenomenon, especially since it is based on the TOE framework. Researchers investigated the predecessors and outcomes of different information technology systems (Tajudeen, *et al.,* 2018; Chatterjee & Kar; 2020; Ahmad *et al.,* 2019). However, from the start-up's perspective, there is a lack of studies exploring start-ups DMA and its usage in an integrated framework (Hasani & O'Reilly, 2020). Accordingly, this study employed an integrative model to examine the predecessors of DMA, its extent, and the effects on performance.

Moreover, most of the studies focused on the relation between social media adoption in SMEs (Dadhich & Hiran, 2022; Qalati, *et al.,* 2022; Oyewobi, *et al.,* 2022; Ma, *et al.,* 2022; Maroufkhani, *et al.,* 2022; Alraja, *et al.,* 2022; Lutfi, *et al.,* 2022; Trawnih, *et al.,* 2021; Setiyani & Rostiani, 2021) and investigated hypotheses that were similar to those in this study. However, from the DM perspective, there is a need to examine DMA and its usage in the context of start-ups operating in developing countries (Chakraborti, *et al.,* 2022). As a result, this study emphasized that DMA is not only limited to social media adoption, but also includes a wide range of DM channels, which are also cost effective and might significantly affect performance, such as websites and SEOs.

6.2 *Practical Implications*

Start-ups should take into consideration the TOE factors that influence their DMA, as these factors have a significant impact on their performance. Ignoring these factors can result in suboptimal performance. By paying attention to these factors, start-ups can better navigate the DM landscape and leverage it to their advantage. Furthermore, this awareness can help start-ups develop targeted strategies that align with their unique needs and goals. To enhance the success of their businesses, start-ups should

try to utilize DM technology and solutions. Moreover, the usage of social media, SEOs, and websites as DM channels should be emphasized, since results have shown that they are popular among start-ups in Egypt.

In addition to that, company owners and managers need to set aside enough money and resources to support DM initiatives. This involves funding competent workers or independent contractors who can successfully handle digital media, as well as giving current staff members training and development chances, to improve their DM abilities, since results have proven that most of start-ups mainly depend on themselves, qualified staff, or family members to manage their DM efforts. Start-ups can also seek the support of the government and business angels if needed in their DM practices.

To improve DMA, start-ups should proactively address any challenges that they encounter. Staying current with the latest technological developments in DM would allow start-ups to leverage the newest and most effective tactics. By being agile and adaptable, start-ups can increase their chances of success in the highly competitive digital marketplace by focusing on the TOE factors that affect DMA and investing in the required resources and strategies to support DM operations.

7. Limitations and Future Research

In all scientific studies, it is vital to identify the limitations that the matter presents, to serve as a foundation for future work. The advancement of knowledge about start-ups' usage of DM is greatly aided by academics and researchers.

To obtain a better understanding of the relationship between the variables, larger samples need to be investigated. Moreover, this study was cross sectional and hypotheses were examined at a particular time, future research can combine longitudinal studies

or mixed methodologies, to better explain DMA among start-ups in developing countries. In addition to that, the effects of demographic variables were not included in this study. However, demographics can have a more explanatory power, which can be explored in future research.

Furthermore, to provide insights and direction for owners and managers, more research on the TOE factors that influence DMA should be undertaken. For example, scholars and academics may examine and evaluate the TOE factors that affect start-ups' DMA individually, and by doing so, they can provide insightful advice and methods that can help businesses increase their performance and competitiveness. In addition to that, as previously mentioned, most of previous studies have focused solely on social media adoption, whereas in this study, it was found that other DM channels, such as SEOs and websites are widely used by start-ups and might also contribute positively to performance. Hence, focusing on examining the relationship between the TOE factors and performance, in relation to SEOs and websites as DM channels, are recommended for future studies.

8. Conclusion

The purpose of this study was to examine the impact of the TOE factors on the performance of start-ups. It also investigated the mediating role of DMA in Egypt. To reach the research objectives, a quantitative research method was employed, where questionnaires were distributed, targeting 205 start-ups in Egypt.

To test the proposed hypotheses, SEM was deployed using smart PLS. The findings of the study revealed that TF were significant with both start-ups DMA and performance. OF were significant with DMA but were insignificant with performance. EF were also significant with DMA but had an insignificant effect on performance. DMA had a positive significant effect on

performance and positively mediated the relationship between the TOE factors and performance.

To the best of the researcher's knowledge, this is the first study of its kind to comprehensively analyze the effects of these variables on start-ups in Egypt and elaborates on their relations. This study serves as foundation for future research and offers several theoretical and practical implications that can help start-ups realize the advantages of DM and identify the rationale behind start-ups investment in DM.

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Appendix

Table A1 Item Loadings

Construct	Item	Loadings
Business Angel Support	I am aware of business angels that support DMA in start-ups	0.813
	I am aware of websites and other online solutions that are connecting business angels and start-ups	0.899
	I am aware of business angels providing free training to support DMA in start-ups	0.877
	I am aware of business angels who would prefer to invest in a start-up if the company has already adopted DM	0.835
Governmental Support	I am aware of government funds and grants to support start-ups	0.923
	I am aware of government policies and initiatives that support start-ups	0.945
	I am aware of government programs that promote DMA in start-ups	0.954
	I am aware of government programs that support employees training for DMA, implementation, and maintenance	0.862
External Pressure	Customers' requirement is a factor that indicates if my start-up needs DMA	0.648
	Customers' behavior is a factor that indicates if my start-up needs DMA	0.644
	Customers are requesting DMA to do business with my start-up	0.847
	DMA is becoming a necessity to compete in the current business environment	0.685
	I am aware of competitors who have adopted DM	0.653
	I believe my start-up will lose its customers to competitors if it does not adopt DM	0.799
Entrepreneurial Orientation	Innovations are appreciated above everything else	0.716
	In our start-up, we emphasize risk-taking	0.717

	We are typically ahead of competitors in presenting new products or procedures	**0.779**
	We emphasize Research and Development (R&D), technological leadership, and innovativeness instead of trusting only those products and services, which we have traditionally found to be good	**0.765**
	Since our start-up launch, we have brought several new products or services to the market	**0.627**
Management Support	**Top management in my start-up considers DMA important**	**0.841**
	Top management in my start-up has shown support for DMA	**0.898**
	Top management emphasis on R&D, technological leadership, and innovations.	**0.913**
Internal Finance resource	**My start-up is capable of finding and hiring needed skillful consultants for DMA**	**0.739**
	My start-up is able to provide needed coaching to employees to setup and maintain DMA	**0.807**
	Sufficient financial resources are available in my start-up for DMA	**0.738**
	Sufficient financial resources are available in my start-up to maintain DMA	**0.799**
	Sufficient financial resources are available in my start-up to train employees to use DM	**0.806**
	There are enough technical staffs in my start-up to maintain DMA	**0.774**
	There is strong support for DMA among technical members of my start-up	**0.832**
Compatibility	**DMA is compatible with our business processes and operations**	**0.833**
	DMA is compatible with my start-up IT infrastructure	**0.886**

	DMA is consistent with the company's beliefs and values	**0.906**
Observability	**I Believe DMA is being used by other start-ups**	**0.724**
	I know experts or companies that I can acquire new DM techniques from them	**0.504**
	Our customers know more about our start-up when we use DM	**0.878**
	We can see our customers interested when we use DM	**0.814**
	We can observe the results of our DM programs	**0.875**
Perceived Advantage	**DMA enables my startup to gain a competitive advantage over non-adopting startup companies**	**0.788**
	DMA enables my start-up to analyze and understand customer behavior and requirements more efficiently	**0.788**
	DMA helps to manage customer relationship more effectively	**0.718**
	DMA enables my start-up to serve customers better and increase customers satisfaction	**0.816**
	DMA enables my start-up to establish and maintain a long-term relationship with existing customers and increase customer retention rate	**0.854**
	DMA provides timely information to customers and increase customers' loyalty	**0.701**
	DMA attracts more potential customers and increase my start-up selling opportunities	**0.802**
Trialability	**I am allowed to try new DM tools for enough time before deciding to adopt them or not**	**0.869**
	I believe there are enough people in my start-up to help in trying various DM tools before adoption	**0.784**
	I have the chance to test and try DM tools before deciding to adopt them or not	**0.887**

DMA	DMA enables us to develop customer relations	0.821
	DMA enables us to communicate with customers	0.797
	DMA enables us to get referrals (word of mouth via likes, shares, and followers)	0.786
	DMA enables us to conduct customer service activities	0.801
	DMA enables us to receive customer feedback on existing product/services	0.797
	DMA enables us to receive customer feedback on new/future product/services	0.797
	DMA enables us to reach new customers	0.777
	DMA enables us to Search for general information	0.808
	DMA enables us to conduct marketing research	0.814
	DMA enables us to advertise and promote product/services	0.705
	DMA enables us to search for competitor information	0.804
	DMA enables us to search for customer information	0.816
Performance	Improved service quality	0.854
	Improved the customer relationship	0.899
	Increased company brand visibility and reputation	0.902
	Increased customer engagement	0.826
	Increased customer loyalty and retention	0.856