

Social media adoption and performance of the manufacturing sector of Bangladeshi SMEs: A TOE framework perspective

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Abstract

Globalization and swift digitization have posed challenges for small and medium enterprises (SMEs) in the competitive market. Moreover, the advent of modernization has formed both challenges and prospects for SMEs. SME firms have begun using social media (SM) applications to reach target audiences, develop relationships with prospective consumers, and retain existing consumers. Nevertheless, little attention has been paid to a comprehensive acceptance of social media (SM) in Bangladesh. This research examines the impact of the TOE framework on SM adoption and on SME firms' performance. A purposive sampling method has been adopted to reach the targeted respondents. Using a structured questionnaire, a total of 353 data points were collected from various districts of Bangladesh. SmartPLS 4 has been used for the path analysis. The study shows a positive and significant impact of relative advantage on compatibility with social media adoption. Perceived employee capability, cost-effectiveness, and top management support (organizational factors), as well as competitive pressure and perceived customer pressure (environmental factors), significantly increase SM adoption. SMEs' performance is also

influenced by the adoption of SM. The study offers numerous suggestions for policymakers, SME foundations, and researchers interested in SM and its applications.

Keywords: Social media adoption, TOE framework, SME performance, Bangladesh

JEL Classification: F21, H25, O16

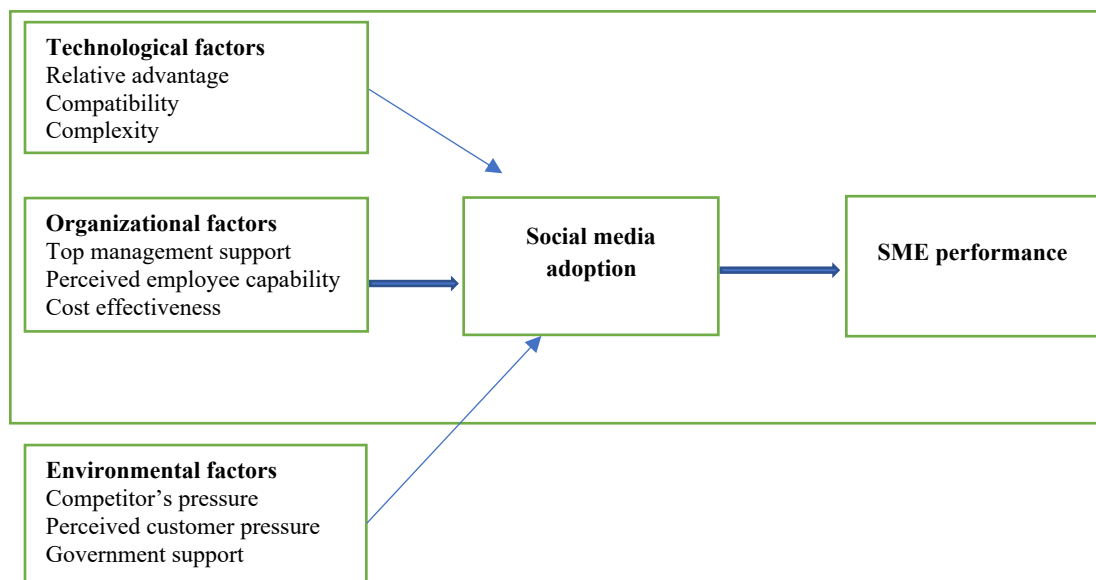
1. Introduction

The SMEs' contribution to overall economic growth through the generation of new job opportunities, the achievement of the SDGs, and the empowerment of women is remarkable (Ali Abbasi et al., 2022; Moulick & Khan, 2025; Odoom & Mensah, 2019). Multinational trade has long been dominated by large companies, with SMEs serving as the starting point. SMEs develop 80 percent of industry jobs in Bangladesh (Moulick & Khan, 2025). This sector requires less energy and local resources that remain unused. SMEs account for over 95% of all businesses, generate approximately 50% of global value added, and produce around 60% to 90% of all new jobs. SMEs are a key driver of entrepreneurial activity, product innovation, and broader improvements in countries (Alkhateeb & Abdalla, 2021; Moulick & Khan, 2025). Furthermore, SMEs are crucial for social integration, innovation, and combating scarcity. In the era of globalization and digitalization, SMEs face both exciting opportunities and challenges. SM is a crucial way for SMEs to address the competitive market sustainably (Berto Mulia Wibawa et al., 2022; Chatterjee & Kumar Kar, 2020; Hair et al., 2019). The SM platform offers opportunities to improve marketing, make companies more competitive, and continue operations more efficiently. But not all SMEs use SM, even though it has considerable potential. This is due to difficulties with their business, their technological tools, and the environment around them (Geurin & Burch, 2017; Jung & Jeong, 2020; Kaplan & Haenlein, 2010; Tajudeen et al., 2018).

The TOE model is widely accepted as a foundational theoretical model for academic research on SM adoption. This framework identifies numerous components that affect the acceptance of SM. Among these influencing factors, relative advantages, compatibility and complexity are technological factors. The top management support, cost effectiveness and perceived employee capability are institutional or organizational factors. The firm's economic sustainability, competitors' pressure, and vendor support influence firms to select and accept new technologies (Ali Qalati et al., 2020; Chatterjee et al., 2021; Qalati et al., 2021; Wang et al., 2016). Incorporating the SM is particularly beneficial for SMEs due to its attractive features, such as visibility, which inspires consumers to work with the firm and facilitates better communication. Nevertheless, this boost in welfare is overshadowed by challenges, such as insufficient technical knowledge and financial resources (Chege & Wang, 2020; Salam 2019; Samat et al., 2018; Wong et al., 2020). Additionally, experiential research frequently highlights the need for further investigation into how to improve the performance of SMEs, particularly in emerging countries.

Despite the universal acknowledgment of social media's potential benefits for SMEs, most prior research has focused on industrialized countries. Additionally, few studies have examined how SM adoption influenced the SMEs' success with the assistance of TOE drivers (Adoyi et al., 2022; Arianty & Julita, 2019; Daowd et al., 2021; Wardati & Er, 2019). This research seeks to report this gaps by scrutinizing the impact of TOE model factors on SM acceptance and assessing the TOE model subsequent impact on SME performance, considering the Bangladeshi perspective. The research has examined the manufacturing sector of Bangladeshi SMEs, using a systematic analysis of the issues influencing SM adoption within the TOE model. The outcomes have applied implications for increasing digital adoption among Bangladeshi SMEs in the manufacturing sector. This research contribution is very important, especially regarding the post-COVID-19 pandemic effects and firms' dependence on digital technology for development and sustainability. SMEs, a crucial part of the economy, contribute around 28%-30% to GDP in Bangladesh. For that, they need to be digitalized to stand ahead of the struggle (Jin & Hurd, 2018; Luthen & Soelaiman, 2022; Öztamur & Karakadılar, 2014; Trawnih et al., 2021). This research supports the development of strategies that show the public in adjacent areas how to make the most of technology, inspire others to use SM, and make SMEs in Bangladesh more economically sustainable. Consequently, this study purposes to examine the effect of TOE elements on SM acceptance and assess the resulting impact on SME performance from a Bangladeshi perspective.

2. Conceptual Framework



Source: Qalati, S. A., Yuan, L. W., Khan, M. A. S., & Anwar, F. (2021) and the authors.

3. Literature review

The Technology-Organization-Environment (TOE) model expresses that the acceptance of new technology depends on three factors. These factors are technological, organizational, and environmental (Ali et al., 2016; Derham et al., 2011; Erdin & Ozkaya, 2020; Odoom & Mensah, 2019). These three factors serve as pillars that enable a business firm to assess the appropriateness of digitalization, cloud computing, and artificial intelligence adoption (Annisa & Er, 2019; Bruce et al., 2023; Pervin & Sarker, 2021).

3.1. Technological Context

In the TOE model, technological factor is an important issue which considers relative advantage, compatibility and complexity (Berto Mulia Wibawa et al., 2022; Cao et al., 2018; Chatterjee & Kumar Kar, 2020). This study examines technological factors that affect the adoption of SM by SME firms in Bangladesh.

3.1.1 Relative Advantage

The factor of relative advantage is widely recognized as having a fundamental effect on the adoption of new technology. This factor has been used by numerous researchers for its special features, such as accomplishing tasks very quickly, maintaining good communication with clients, and sending information to customers about products or services very quickly (Geurin & Burch, 2017; Jung & Jeong, 2020; Tajudeen et al., 2018). The definition of this factor can be a person's opinion at the individual level that the new technology is better than the present one (Adam, 2020; Luthen & Soelaiman, 2022). Consequently, the features SMEs hold that confer a relative advantage in innovation increase the likelihood of adoption. The factor of relative advantage is identified as a main determining factor for incorporating the procedure for the implementation of technology (Ali Abbasi et al., 2022; Derham et al., 2011; Erdin & Ozkaya, 2020; Nuseir, 2018). Furthermore, the concept of relative advantage is acclaimed for improving the efficiency and development of SME firms, ultimately enhancing business performance. It is therefore hypothesized:

H₁: The relative advantages of technological context have a significant positive effect on SM adoption.

3.1.2. Compatibility

In technological factors, Compatibility means that the adopter's philosophies, involvements, and requirements are assumed to align with the adopted technology (Ali Qalati et al., 2020; Chatterjee et al., 2021; Nuseir, 2018). Reliability is a crucial element of operational technological modernization. The adopted technology is compatible with the company's information technology infrastructure. Therefore, this adoption is less likely to fail (Alghamdi, 2024; Hassan et al., 2018; Öztamur & Karakadılar, 2014). At the same time, if the execution of SM is well-matched with

business processes, operations, and organizational values, its adoption supports sustainability. Consequently, compatibility significantly increases the adoption of SM, and this adoption plays a vigorous role in augmenting success. It is therefore hypothesized:

H₂: The compatibility of technological context has a significant positive effect on SM adoption.

4.1.3. Complexity

Using and implementing technology requires significant mental effort. Using SM marketing would be frustrating (Alghamdi, 2024; Hassan et al., 2018; Jin & Hurd, 2018). Therefore, the complexity of technology negatively affects the adoption of SM (Fan et al., 2021; Nuseir, 2018). Likewise, the complexity of adopting information technology influences the implementation of e-commerce in SME firms. Furthermore, the skills required to adopt SM marketing are complex for employees of firms (Fan et al., 2021; Fang et al., 2022; Franco et al., 2016). Similarly, in the UAE, the complexity positively affects SM adoption, and the use of SM sharply increases the achievement or success of SME firms (Nuseir, 2018). It is therefore hypothesized:

H₃: The complexity of technological context has a significant effect on SM adoption.

3.2. Organizational Context

Organizational characteristics, an important aspect of the TOE model, significantly affect the use of SM. Top management support, perceived employee support, and cost-effectiveness are the organizational factors that are needed in order to assist the adoption of social media (Ali et al., 2016; Chatterjee et al., 2021; Long Tuan Kechik et al., 2023; Nuseir, 2018; Rahman et al., 2016). Some earlier research studies have recognized employee perception, perception of cost, and top management assistance as vital interpreters of the use of SM by SME firms (Berto Mulia Wibawa et al., 2022; Chege & Wang, 2020; Long Tuan Kechik et al., 2023).

3.2.1. Perceived employee support

The adoption of social media would be ineffective, and SMEs' performance would be insufficient if employees lacked the necessary skills (Ali et al., 2016). Therefore, adequate knowledge and skills in information technology are key barriers to technology adoption among SMEs. Numerous prior studies have highlighted the importance of employees' knowledge of technology application (Derham et al., 2011; Erdin & Ozkaya, 2020; Odoom et al., 2017; Odoom & Mensah, 2019; Solomon et al., 2023). With the use of technology, employees will be able to learn new social media marketing and solve marketing-related problems very easily. It is therefore hypothesized:

H₄: The perceived employee support of organizational context has a positively significant relation with social media adoption.

3.2.2. Cost-effectiveness

All over the world, SMEs face a scarcity of internal funds and have limited access to bank credit (Moullick & Khan, 2025). At the same time, firms must invest time and effort in marketing, branding, and customer service. The competitors of SMEs are large firms and MNCs. Costs related to marketing, branding, and customer service are high with traditional methods (Ali et al., 2016, 2016; Chatterjee et al., 2021; He et al., 2017; Rahman et al., 2016; Sarosa, 2012). To survive in the market, firms must manage these costs. Therefore, adopting social media reduces the costs of conversation, advertising, branding, and consumer support (Ali Qalati et al., 2020; Jin & Hurd, 2018; Odoom et al., 2017; Odoom & Mensah, 2019; Solomon et al., 2023). It is therefore hypothesized:

H₅: The cost-effectiveness of organizational context has a positively significant relation with SM adoption.

3.2.3 Top Management Support

Top management support refers to the level of assistance provided to implement technology to develop the corporation. Numerous academics have assessed the criticality of higher authority in turning the implementation of technology into an effective reality (Fan et al., 2021; Fang et al., 2022; Jin & Hurd, 2018; Nuseir, 2018; Solomon et al., 2023). The approval of higher authority for the implementation of technology depends on the power to govern attitudes, doctrines, and thoughts within the hierarchy at the administrative levels. Furthermore, the position of top management is significant for the acceptance of SM marketing by influencing subordinates (Abu Bakar et al., 2019; Ahmad et al., 2019; Ainin et al., 2015; AlQershi et al., 2020; Annisa & Er, 2019; Öztamur & Karakadılar, 2014). Top management also seeks to develop the business by communicating the firm's vision, distributing resources, and providing intellectual support (Bruce et al., 2023; Imran & Jian, 2018; Musa et al., 2016; Rozak et al., 2023; Tiwasing, 2021; Wanyoike & Kithae, 2019). Consequently, adoption of SM and top management support are positively associated with each other. It is therefore hypothesized:

H₆: The support of top management has a positively significant relation with social media adoption.

3.3 Environmental Context

The external competitive pressure, consumer pressure, vendor support, and government support formed the environmental context (Ali Qalati et al., 2020; Chatterjee et al., 2021; Sarosa, 2012). This context is a crucial issue for social media adoption. These environmental context issues force business organizations, especially SME firms, to incorporate social platforms for the survival, communication and sustainability of a business (Daowd et al., 2021; Long Tuan Kechik et al., 2023).

3.3.1 Competitive Pressure

Competitive market, a key force for SM adoption, creates pressure in the business market and encourages trade and service landscape businesses to adopt SM to improve brand visibility, communicate with consumers, and maintain a competitive edge (Ali Abbasi et al., 2022; Cahyadi et al., 2024; Öztamur & Karakadılar, 2014; Sarosa, 2012; Sohn & Kim, 2020). Hundreds of digitalized businesses are entering the market daily. Therefore, without SM, the existing businesses will lose customers to opponents occupied with online shopping. Businesses try to use a digital platform because around 77% internet users are involved in at least one SM platform, and they search for products before buying (Berto Mulia Wibawa et al., 2022; Cao et al., 2018; Geurin & Burch, 2017; Hair et al., 2019; Kaplan & Haenlein, 2010). Furthermore, SM gives an opportunity for cost-effectiveness over traditional marketing. SM provides instant brand adoption and long-term loyalty for uninterrupted communication and consumer assessments (Alghamdi, 2024; Jin & Hurd, 2018; Nuseir, 2018). SM adoption significantly increases the business elasticity through adopting dynamic market changes and disruptions of SME firms. SMEs in numerous businesses, such as tourism and food, use SM to bridge the gap between online promotion and physical marketing (Alghamdi, 2024). It is therefore hypothesized:

H₇: The competitive pressure has a significant positive relation with SM adoption.

3.3.2 Perceived Customer pressure

In Bangladesh, around 60 million SM users who are highly smartphone-influenced mandate real-time responses and transparency, and are the main influencers for SM adoption (Amoah et al., 2023; Ur Rahman et al., 2020). This huge force is the main customer of Bangladeshi SMEs. The consumer instantly shifts to competitors if they do not get a real-time response. In Bangladesh, 80 percent of customers make their buying decision based on user-generated content, reviews, and recommendations (Pervin & Sarker, 2021). Therefore, businesses without a digital platform lack credibility. Consumers select their products based on user reviews and sellers' prices. Furthermore, buyers are significantly influenced by video content across Facebook, WhatsApp, and YouTube rather than traditional billboards or ads (Franco et al., 2016; Odoom et al., 2017; Rahman et al., 2016; Solomon et al., 2023). SMEs having a problem of capital shortage cannot make a big budget for promotional activities, but SM requires a few. We therefore assume that:

H₈: The perceived customer pressure of environmental context a significant positive relation SM adoption.

3.3.3 Government Support

Government support plays a significant role in helping SMEs adopt social media and advance financial development (AlQershi et al., 2020; Annisa & Er, 2019; Audretsch & Belitski, 2021). It helps implement social media by minimizing barriers through targeted training, economic incentives, and strategic frameworks that build overall self-efficacy (AlQershi et al., 2020). The

government provides subsidies and grants for costs associated with technology adoption. Furthermore, it can help implement the technology beyond SMEs by developing environments such as tax incentives, funding for structural development, and regulatory oversight (Öztamur & Karakadılar, 2014). Technical training programs can improve digital literacy and give business owners technical confidence. This training enables SMEs to reach global audiences and engage directly with customers. It is therefore hypothesized:

H₉: The government support of the environmental context has a significant positive relation with SM adoption.

3.4 SM adoption and the performance of SME firms

Scholars have acknowledged the growing significant position of SM adoption, which will be helpful for SME firms (Qalati et al., 2021). The scholars too emphasize the use of SM. The scholars try to enhance teamwork with regard to knowledge creation and the achievement of SME firms (Ali et al., 2016; He et al., 2017; Sarosa, 2012; Solomon et al., 2023). Prior scholars identified that adoption of SM positively increase the performance, and it also has some risks (Berto Mulia Wibawa et al., 2022; Cao et al., 2018; Geurin & Burch, 2017; Kaplan & Haenlein, 2010). At the same time, a research work on 217 shops reveals a significant association between uses of SM and firms' achievement in Thailand (Charoensukmongkol & Sasatanun, 2017). A study on Kenya also reveals a significantly positive relation between the use of technology and firm performance (Wanyoike & Kithae, 2019). Nevertheless, the emergence of SM, adoption of cloud accounting and technologies that boost virtual conversation, product distribution and participating of knowledge, affects in increasing sales volume and expand growth and development in performance (Adam, 2020; Ainin et al., 2015; Alghamdi, 2024; Ali Qalati et al., 2020; Cahyadi et al., 2024; Chege & Wang, 2020). Consequently, this research is directed to discover the elements prompting SM adoption and firms' performance.

H₁₀: The adoption of SM has a significantly positive relation with the performance of SME firms.

4. Methodology

4.1. Sample, Sampling technique and data collection

The quantitative approach, including the collection of numerical data, the execution of statistical analysis, and the identification of patterns of relationships, has been used in the present research to test hypothesized relationships. Purposive sampling is a non-probability sampling technique in which examiners select respondents based on their ease of access, proximity, and availability. The study sample was collected from SMEs across different districts of Bangladesh and was selected with authorization from the SME Foundation. As a purposive sample, a web-based, closed-ended questionnaire (created via Google Forms) was selected to collect the data. The questionnaire link was given away through SM platforms (WhatsApp) and individuals' emails to accumulate information from respondents. This research targeted only manufacturing SMEs. Approximately

353 complete questionnaires were used in the research analysis. The owner or manager of the SME firms was considered a respondent due to being well informed about performance and circumstances.

Table 1. Demographic profile of the study

Assets range and no of Employee	Assets Tk 7.5 to 150 million, with 31 to 120 employees	298	84.42 percent
	Assets Tk 150 - 500 million, with 121 to 300 employees	55	15.58 percent
Social Media adoption	Face book	155	43.91 percent
	WhatsApp	250	70.82 percent
	Twitter	74	20.96 percent
	Instagram (SMEs use more than one media)	45	12.75 percent
Respondent	Owner	98	27.76 percent
	Manager	255	72.24 percent
Size of the firm	Small	298	84.42 percent
	Medium	55	15.58 percent

Source: Authors' preparation based on survey data

Table 1 presents the demographic profile of the respondents, showing that 84.42 percent of the sample firms' assets range from 7.5 million to 150 million, and that the number of employees ranges from 31 to 120. Only 15.58 percent of respondents' assets are between 150 and 500 million taka, with the number of employees ranging from 121 to 300. Among social media platforms, SME firms mostly use Facebook and WhatsApp (43.91% and 70.82%, respectively). Most of the respondents (255) are managers which is 72.24 percent.

4.2 Measures

A 5-point Likert scale questionnaire was assigned in this research (1 refers to strongly disagree, 2 refers to disagree 3 refers to neutral, 4 refers to agree and 5 = strongly agree), allowing respondents to select from a range of options. This research study includes TOE framework (Qalati et al., 2021). The technology scale includes relative advantage, compatibility, and complexity. The relative advantage (RA) scale comprises five items. Compatibility and complexity were each measured by 4 factors. Top management support, considered an organizational factor, is measured by 3 factors. Furthermore, perceived employee capability and cost effectiveness, important organizational

factors, are each measured by 4 factors. Among the environmental factors, Competitive pressure is measured by 4 issues, customer pressure by 3, and government support by 3 factors. The dependent variables, SM adoption and SME performance, were each measured by 4 important factors. Table 2 presents the mean value, standard deviation and factor loadings. The Table 2 also showed the value of Cronbach's alpha, composite reliability, Average Variance Extracted (AVE) and variance inflation factor (VIF).

4.3 Research model

$$i) SMA = \alpha + \beta_1 RA + \beta_2 COM + \beta_3 CP + \beta_4 TMS + \beta_5 PEC + \beta_6 CE + \beta_7 COP + \beta_8 PCP + \beta_9 GS + \varepsilon$$

$$ii) SMEP = \alpha + \beta_1 SMA + \varepsilon$$

SMEP = SME performance; SMA = Social Media Adoption; α = constant; RA = relative advantage; COM = compatibility; CP = complexity TMS = Top management support; PEC = perceived employee capability; CE = cost effectiveness; COP = Competitor's pressure; PCP = perceived customers' pressure; GS = Government Support

4.4 Data Analysis

The researcher has used the PLS-SEM, a variance-based statistical method, using SmartPLS 4 and its tools (e.g., algorithm, blindfolding, and bootstrapping) to check the research model and hypotheses (Alghamdi, 2024; Ali Qalati et al., 2020; Erdin & Ozkaya, 2020; Odoom & Mensah, 2019; Qalati et al., 2021). It has been used to analyze complex cause-and-effect relationships among latent and observed variables. SmartPLS 4 conveys contemporary examination of both structural and measurement models, which results in more accurate results (Qalati et al., 2021). Furthermore, IBM SPSS has been used for descriptive statistics, and the KMO measure of sampling adequacy shows a value of 0.760, which is better compared to the tolerable threshold of 0.5 (Qalati et al., 2022). So, the sample size of this research is sufficient.

Table 2. Constructs Item :Their Respective Descriptive Statistics and Measurement Model

	Items	Mean	SD	Loadings	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	AVE	VIF
Cost effectiveness	CE3	4.454023	0.728712	0.846	0.794	0.794	0.831	0.711	1.217
	CE4	4.336207	0.813545	0.841					1.217
Compatibility	COM3	4.270115	0.896052	0.863	0.767	0.767	0.857	0.75	1.334
	COM4	4.275862	0.88131	0.869					1.334
Competitive pressure	COP1	4.445402	0.724146	0.791	0.712	0.71	0.827	0.614	1.436
	COP2	4.465517	0.713368	0.815					1.27
	COP4	4.295977	0.763947	0.743					1.381

Complexity	CP1	3.149425	1.34981	0.843	0.879	0.884	0.917	0.734	2.146
	CP2	3.112069	1.388123	0.842					2.236
	CP3	3.158046	1.319667	0.89					2.664
	CP4	3.16092	1.453396	0.85					2.172
Govt. support	GS1	4.270115	0.896052	0.783	0.701	0.72	0.833	0.626	1.335
	GS2	4.275862	0.88131	0.87					1.701
	GS3	4.206897	0.928423	0.713					1.389
Perceived customer pressure	PCP1	4.390805	0.72987	0.861	0.752	0.752	0.852	0.742	1.306
	PCP2	4.433908	0.750562	0.861					1.306
Perceived employee capability	PEC1	4.313218	0.812119	0.872					1.298
	PEC2	4.37069	0.761428	0.765	0.658	0.68	0.763	0.53	1.234
	PEC4	3.261494	1.014597	0.791					1.09
Relative advantage	RA1	4.0028736	0.0536056	0.776	0.806	0.809	0.865	0.563	1.743
	RA2	4.241379	0.817186	0.782					1.704
	RA3	4.316092	0.809223	0.743					1.633
	RA4	4.362069	0.793306	0.725					1.414
	RA5	4.336207	0.824103	0.724					1.594
	SMA1	4.413793	0.684143	0.736	0.725	0.726	0.829	0.548	1.371
Social media adoption	SMA2	4.474138	0.667844	0.733					1.385
	SMA3	4.275862	0.878034	0.729					1.337
	SMA4	4.310345	0.807891	0.763					1.417
SME performance	SMEP1	4.454023	0.732656	0.764	0.685	0.689	0.762	0.545	1.302
	SMEP2	4.304598	0.77369	0.712					1.097
	SMEP3	4.382184	0.792925	0.873					1.302
	SMEP4	4.431034	0.761738	0.718					1.16
Top management support	TMS1	4.422414	0.797881	0.75	0.679	0.679	0.757	0.51	1.169
	TMS2	4.227011	0.808931	0.756					1.142
	TMS3	4.215517	0.753161	0.823					1.09

Source: Authors' preparation based on survey data

4.5 Common Method Bias (CMB)

The full-collinearity approach, a statistical technique, was used in SmartPLS to assess and appraise the CMB (Ali Qalati et al., 2020; Cao et al., 2018; Hair et al., 2019; Qalati et al., 2021, 2022). Recently, the full-collinearity approach was used to estimate the influencing factors of SM adoption and its effect on SME performance (Ali Qalati et al., 2020; Nuseir, 2018; Qalati et al., 2021; Solomon et al., 2023). The variance inflation factor is also used to assess the degree of

Table 3. Discriminant Validity (Using HTMT Criterion)

	CE	COM	COP	CP	GS	PCP	PEC	RA	SMA	SMEP	TMS
CE											
COM	0.728										
COP	0.808	0.746									
CP	0.126	0.446	0.509								
GS	0.771	0.358	0.882	0.529							
PCP	0.751	0.769	0.821	0.337	0.837						
PEC	0.703	0.740	0.784	0.368	0.869	0.745					
RA	0.681	0.782	0.800	0.483	0.817	0.688	0.746				
SMA	0.775	0.198	0.822	0.481	0.168	0.209	0.823	0.770			
SMEP	0.606	0.642	0.696	0.450	0.734	0.655	0.610	0.653	0.706		
TMS	0.814	0.794	0.836	0.693	0.844	0.724	0.604	0.821	0.841	0.851	

Source: Authors' preparation based on survey data

Table 4. Path Coefficient and Hypotheses Testing

Hypothesis	Relationship	Path Coefficient	T statistics	P values	Decision
H1	RA -> SMA	0.041	1.969	0.049	Supported**
H2	COM -> SMA	0.533	4.759	0.000	Supported***
H3	COP -> SMA	-0.016	0.564	0.573	Not Supported
H4	PEC -> SMA	0.046	2.659	0.008	Supported***

H5	CE -> SMA	0.001	1.87	0.061	Supported*
H6	TMS -> SMA	0.027	2.13	0.033	Supported**
H7	CP -> SMA	0.055	3.020	0.006	Supported**
H8	PCP -> SMA	0.526	12.843	0.000	Supported***
H9	GS -> SMA	0.019	0.209	0.834	Not Supported
H10	SMA -> SMEP	0.465	9.980	0.000	Supported***

***hypotheses accepted 1% level of significance; **hypotheses accepted 5% level of significance;
*hypotheses accepted 10% level of significance;

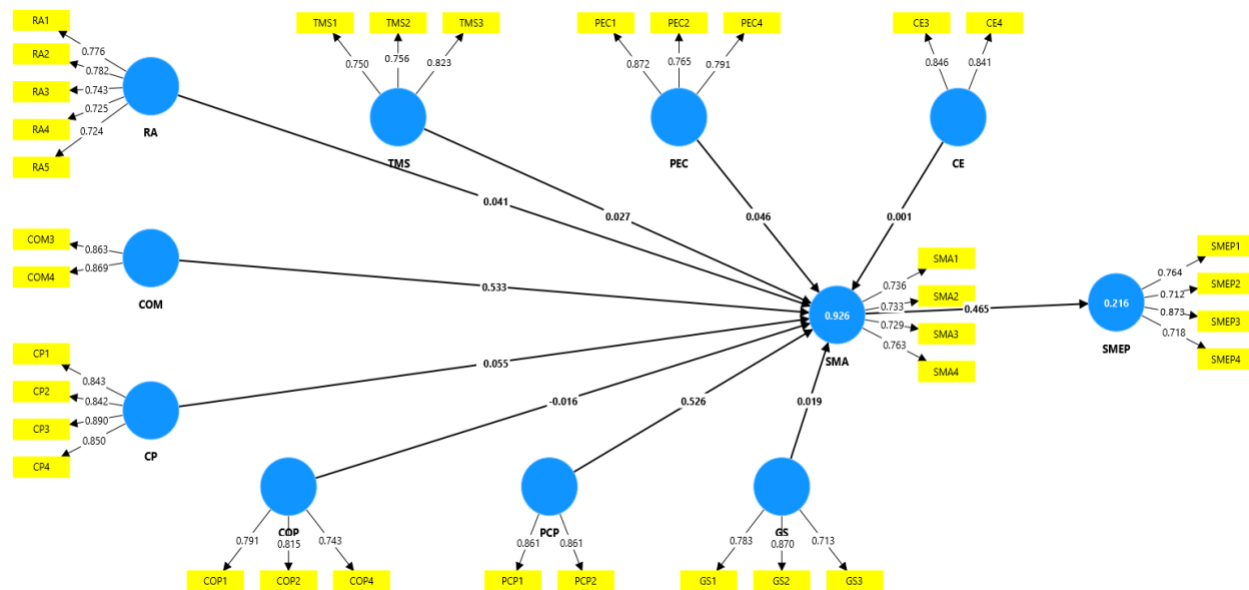
Table 5: STDEV, F-square, R-square, Adjusted R-square and Model Fit

	STDEV	F-square	R-square	Adjusted R-square	Model Fit
CE -> SMA	0.021	0.000	0.926	0.924	SRMR 0.075
COM -> SMA	0.112	0.280			
COP -> SMA	0.028	0.001			
CP -> SMA	0.017	0.028			
GS -> SMA	0.023	0.000			
PCP -> SMA	0.027	2.153			
PEC -> SMA	0.020	0.017			
RA -> SMA	0.041	0.009			
SMA -> SMEP	0.091	0.275			
TMS -> SMA	0.047	0.005			

Source: Authors' preparation based on survey data

collinearity (Erdin & Ozkaya, 2020a; Odoom et al., 2017a). PLS-SEM has been used in this research work. A value greater than or equal to 5 is suggestive of collinearity among the variables (Ainin et al., 2015). In this study, all of the constructs' VIF values were less than 5 and close to 2. Therefore, the research data are free from collinearity (see Table 2).

Figure 1. Structural modeling represents outer loading, path coefficients, and R-squared



5. Outcomes and analysis

5.1 Appraisal of the Measurement Model

The reliability of each item is assessed using the measurement model. The measurement model also showed the validity of each factor used here (Nuseir, 2018; Solomon et al., 2023). To check the reliability, the researcher used two different tests. One is Composite reliability (CR), and a standard benchmark of CR for an acceptable reliability value is at least 0.7 (Ali Qalati et al., 2020; Franco et al., 2016). The another test is Cronbach's alpha (CA) and standard benchmark for acceptable reliability value is at least 0.07 (Alghamdi, 2024; Brooks, 2019; Haque et al., 2024). Both values (CR) and (CA) for this research were bigger than the suggested values (Table 2). To test the validity, the discriminant and convergent validity tests are done by the previous researchers (Derham et al., 2011; Odoom et al., 2017; Odoom & Mensah, 2019; Qalati et al., 2021; Solomon, 2023). The factor loadings calculates the convergent validity and a standard benchmark of factor loadings for an acceptable convergent validity is at least 0.07 (Berto Mulia Wibawa et al., 2022; Chatterjee & Kumar Kar, 2020; Hair et al., 2019). The another scale for measuring convergent validity is average variance extracted (AVE) and a standard benchmark of AVE value for an acceptable validity is at least 0.5 (Alatawi et al., 2013; Erdin & Ozkaya, 2020; Pervin & Sarker, 2021). The factor loadings and AVE values for this study were much better than the recommended value (Table-2). For discriminant validity, this researcher used the heterotrait-monotrait ratio (HTMT) test, and the recommended value for this test is less than 0.85 (Berto Mulia Wibawa et al., 2022; Cao et al., 2018; Hair et al., 2019; Kaplan & Haenlein, 2010). The HTMT value for this research has fulfilled the satisfactory level (Table-3).

5.2 Appraisal of the Structural Model

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To measure the research model's structure, the researcher has used hypothesis tests and the R-squared test. Before assessing the structural model, the VIF test was used to check for CMB and the standard benchmark of VIF is more than 5.00, and the outcomes were within the acceptable limit (Table 2). Then, a bootstrapping technique with 5000 subsamples for 352 cases was used to measure the relationships among SME performance, SM adoption, and various factors of SM adoption, and to assess the path coefficient and its significance. The level of significance is determined by the p-value (<0.05) and t-value (>1.96). The outcomes indicate that the TOE factors have a significant influence on SM adoption and that SM adoption has a significant effect on SMEs' performance, except for some factors (Table 4). The R-squared value is 0.926, or 92.6 percent. The recommended values of R-squared are 0.19, 0.33, and 0.60, which are considered weak, moderate, and substantial, respectively (Qalati et al., 2021). To test the goodness of model-fit, the research study used SRMR with a recommended value of <0.08 considered a good fit, and a value of zero indicates a perfect fit (Qalati et al., 2021). The result SRMR of this research study is 0.075, which is satisfactory.

5.3 Discussion of the Results

The study analyzes the factors influencing SM adoption and their impact on SMEs' performance in Bangladesh's manufacturing sector. The TOE framework has played a vital role in identifying the factors of SM adoption. This study delivers a complete picture of SM adoption in the manufacturing sector of SME in the operating countries.

The findings show that the relative advantage factor has a positive and significant impact on SM adoption (Table 4; $p = 0.049$). Therefore, the assumption H_1 is accepted. This outcome is similar to the previous work (Abed, 2020; Ali Qalati et al., 2020; Chatterjee et al., 2021). Another reviewed factor, compatibility, also significantly increases SM adoption (Table 4; $p = 0.000$), so the hypothesis H_2 is accepted. This outcome indicates that the compatibility of SM adoption positively influences its infrastructure, business processes, and operations. The outcome is alike to previous studies (Ali et al., 2016; He et al., 2017; Odoom et al., 2017; Qalati et al., 2021; Sarosa, 2012). At the same time, the result indicates that complexity, a factor in SM adoption, has a negative and insignificant effect on SM adoption (Table 4; $p = 0.573$); therefore, H_3 is rejected in favor of the alternative hypothesis.

In the organizational context, the three factors, perceived employee compatibility, cost-effectiveness, and top management support, significantly increase the adoption of SM (Table 4; $p = 0.008, 0.061$, and 0.033 , respectively), so the null hypotheses H_4 , H_5 , and H_6 are accepted. The result indicates that SME firms adopt social media based on employee compatibility, cost, and top management support. Ali et al., (2016), Chatterjee et al., (2021), He et al., (2017), Qalati et al., (2021), Sarosa (2012) and Solomon et al., (2023) disclosed the same result.

Another important component of the TOE framework is the environmental component. Competitive pressure, a factor in the environmental component, significantly increases SM

adoption (Table 4; $p = 0.006$), so the null hypothesis H_7 is accepted. This outcome indicates that competitive pressure affects SM adoption. Social media helps customers switch to alternative firms for similar products or services with little difficulty, to dissimilar products with the same function, or to social media marketing that competitors already use. The result shows similarity with previous studies (Ainin et al., 2015; Luthen & Soelaiman, 2022; Öztamur & Karakadılar, 2014; Sohn & Kim, 2020; Trawnih et al., 2021).

The perceived customer pressure factor of the environmental component significantly increases SM adoption (Table 4; $p = 0.000$). So, H_8 is rejected. This outcome indicates that customer pressure affects SM adoption. Social media helps customers establish direct relationships with firms. Ainin et al. (2015), Luthen & Soelaiman (2022), Sohn & Kim (2020) Trawnih et al. (2021) and Wang et al. (2016) showed the similar result.

The factor, government support, a factor of the environmental component, has a positive but insignificant influence on SM adoption (Table 4; $p = 0.834$), so the H_9 is rejected. Finally, social media adoption significantly increase the SMEs' performance (Table 4; $p = 0.000$), so the null hypothesis H_{10} is accepted. This outcome indicates that by adopting social media, firms can strengthen customer relationships, improve service quality, increase customer loyalty, and enhance awareness and market share. Firms can also maintain brand visibility and reputation. These capabilities help firms perform better and sustain performance. The results are consistent with previous studies (Adam, 2020; Ali Qalati et al., 2020; Cahyadi et al., 2024; Fang et al., 2022; Franco et al., 2016).

6. Conclusion

This study applies the TOE framework to manufacturing firms in Bangladesh by estimating the numerous factors that increase the acceptance of SM and how adopted social media influence the performance of SMEs. To explore the influencing factors of SM, prior scholars (Alghamdi, 2024; Jin & Hurd, 2018; Luthen & Soelaiman, 2022; Öztamur & Karakadılar, 2014) used the TOE framework. The relative advantage and compatibility of the technological factor have a positive impact on SM adoption, whereas complexity does not increase SM adoption. The result indicates that social media provides a relative advantage, such as promoting firms' products in the market more effectively, accomplishing specific tasks more quickly, and communicating with customers effectively. Social media also helps firms when it is compatible with their infrastructure, business processes, and operations. Among organizational factors, perceived employee capability, cost-effectiveness, and top management support significantly influence social media adoption. Adopting social media saves time and effort in marketing, branding, and customer service. Employee capabilities can easily solve marketing problems through social media. The adoption of SM also requires resource allocation by top management.

Among environmental factors, competitive and customer pressure significantly increase social media adoption, whereas government support does not. Social media helps customers establish

direct relationships with firms. The study provides a comprehensive understanding of the factors influencing decision-makers' identification of the real causes of SM acceptance. Efficient management of SM adoption can enhance SME performance, both financial and non-financial, in emerging countries like Bangladesh. The outcomes indicate that the adoption of social media has a significant impact on SMEs' performance, particularly in terms of the relative advantage of efficiently promoting products to market.

Furthermore, the adoption of SM progresses relationships with consumers and augments their faithfulness. In addition, SM adoption enhances brand visibility, allowing a significant increase in the number of customers. SM has developed two-way communication and allows for instant responses to customers. Moreover, SME firms can share their messages and positive image with their clientele. So, the adoption of SM and its use help SME firms reach prospective industry and target audiences for upcoming associations. The study reveals a positive relationship between social media adoption and the performance of SMEs in emerging countries, especially in Bangladesh. Finally, this study explores why social media can be accepted and how it can be engaged effectively.

6.1 Limitations and future directions

Additionally, the study can assess SMEs' performance across corporate financial indicators, financial soundness indicators, market performance, and functional effectiveness, while accounting for industry-specific and environmental contexts. The study will deliver valuable insights and real-world recommendations for SME managers and businesspersons on how to effectively use the TOE framework and SM to improve their business performance. There are some limitations that will guide upcoming investigation. The research discusses nine factors; it may include other harbinger. These are expertise of the employees, entrepreneurial advice, organizational pressure, and policies imposed by the government that can improve performance of the SMEs. Thus, these limited factors may be considered a drawback. Furthermore, sample size is very low to generalize the outcome. Additionally, this study includes responses from SMEs, such as managers and owners. Conversely, the client concerns were not documented; thus, it would be motivating to observe the effects of social media adoption on SMEs' performance considering employees' and customers' concerns. Moreover, the model was validated among SME firms in a single country via an online survey. The results denote a picture at a specific time, but the impacts of SM are fickle over time. The sample firms are in the manufacturing sector, but the trade and service sectors are not included. Furthermore, future studies can examine the contexts of SMEs and the health sector. Lastly, the causal relationship between SM adoption and outcomes can be scrutinized further, regardless of whether the countries are industrialized.

Declaration of Conflicting Interests

The authors confirmed there were no probable conflicts of interest related to the study and publication of this research.

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Ethics in publishing

The research connecting members were studied and approved and contributors delivered their printed knowledgeable assent to contribute to this study.

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Appendix 1

Questionnaire for the Respondent

Department of Accounting and Information Systems
University of Rajshahi

Serial No.-

Dear Sir/Madam,

I am conducting a research study under the Department of Accounting and information Systems, University of Rajshahi. The title of my research study is “Social media adoption and performance of manufacturing sector of Bangladeshi SMEs: A TOE framework perspective”. You are requested to indicate your opinion by putting **tick mark** (✓) against each question in the box at the right side of the question. Your opinion has great value to us and will be kept confidential.

In the likert type question, various statements are weighted as follows:

5	4	3	2	1
I strongly agree	I agree	Neutral	I do not agree	strongly disagree

Section-A: Profile of the Respondent

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- ### **Section-B: Evaluation of the different Influencing factors of SM adoption.**

			5	4	3	2	1
Technological	RA1	Social media marketing would enable our enterprise to market our products/ services in a better way.					
Relative Advantage	RA2	SM allows us to accomplish specific tasks more quickly.					
	RA3	Social media marketing would enable our enterprise to communicate with our customers effectively.					
	RA4	SM offers interactive mechanisms for value co-creation with our audience.					
	RA5	Social media marketing would assist us in developing better relationships with our customers.					
Compatibility	CO M1	SM adoption is compatible with the company's IT infrastructure.					
	CO M2	SM adoption is compatible with our business processes and operations.					
	CO M3	SM adoption is consistent with the company's beliefs and values.					

	CO M4	Search for general information related to customer and competitors.					
Complexity	CP1	The use of social media marketing would require a lot of mental effort.					
	CP2	The use of social media marketing would be frustrating.					
	CP3	Social media marketing would be too complex for our marketing activities.					
	CP4	The skills needed to use social media marketing would be too complex for employees of our enterprise					
Organizational							
Cost effectiveness	CE1	The cost involved in providing support systems for social media marketing would be too high					
	CE2	SM platform saves costs relating to time and effort in marketing, branding and customer service.					
	CE3	The basic training for employees to use social media marketing would be very low					
	CE4	Both way communication is possible with low cost.					
Perceived Employee Capability (PEC)	PEC 1	Our employees would be capable of learning new social media marketing related technology easily.					
	PEC 2	Our employees would be capable of using social media marketing to interact with our customers.					
	PEC 3	Our employees would be capable of providing new ideas on social media marketing use for our enterprise.					
	PEC 4	Our employees would be capable of using social media marketing to solve our marketing problems easily.					
Top management support	TPS 1	Social media adoption enables us to advertise, promote and deliver products/ services to the customer.					
	TPS 2	Our marketing budgets would be significant enough financial resources to support the adoption of social media marketing.					
	TPS 3	Top management emphasis on R&D, technological leadership, and innovations					

Environmental									
Competitive Pressure	CP1	It is easy for our customers to switch to another company for similar services/products without much difficulty.							
	CP2	There is rivalry among the firms in the industry, our firm is operating in an intense.							
	CP3	Customers are able to easily access to several available products which are different from ours but perform the same functions.							
	CP4	Our enterprise thinks that social media marketing has an influence on competition in their industry.							
Perceived Customer Pressure	PCP 1	Our customers would demand that we establish relationships with them using social media marketing							
	PCP 2	.Our relationship with our major customers would suffer if we did not adopt social media marketing.							
Government Support	GS1	Environmental sustainability improved compliance with environmental standards.							
	GS2	Improvement in community health and safety.							
	GS3	Reduction in environmental impacts and risks to the general public.							
Social media adoption	SM A1	SM allow us to create brand visibility.							
	SM A2	SM allows us to promote our newest products							
	SM A3	Social sustainability improved overall stakeholder welfare.							
	SM A4	SM allows us to increase the visibility of the company.							
SMEs' performance	SME P1	Increased awareness and market Share.							
	SME P2	Improved customer service and quality and Increased customer engagement.							



	SME P3	Increased company/brand visibility and reputation.					
	SME P4	Increased customer loyalty and retention.					

Signature of the respondent