

## Application of social media tools for project management in Rwanda

Oluwaseun Sunday Dosumu<sup>1,\*</sup>, Ayodeji Oke<sup>2</sup>, Oluwaseye Gbeminiyi Dosumu<sup>3</sup>

<sup>1</sup>Department of Construction Management, University of Rwanda, Kigali, Rwanda

<sup>2</sup>Department of Quantity Surveying, Federal University of Technology, Akure, Nigeria

<sup>3</sup>Department of Building, Obafemi Awolowo University, Ile-Ife, Nigeria

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### ABSTRACT

The construction industry, both in developed and developing countries, has increasingly adopted social media tools to improve project management. However, there is a notable lack of documentation regarding the awareness, adoption, and application of these tools in the construction sector of developing countries, particularly in Rwanda. This study aims to investigate the level of awareness, adoption, and application of social media tools in construction projects. To achieve this, we employed a survey research design, administering closed-ended questionnaires to construction professionals in Rwanda, supplemented by unstructured interviews to clarify responses as needed. The findings indicate that respondents are generally aware of and have adopted social media tools for construction project management. Furthermore, a direct correlation exists between the level of awareness and the level of adoption of these tools. However, significant differences were observed between consultants and contractors concerning their awareness and adoption rates. The primary applications of social media tools identified in the study include information exchange and storage, organizational cooperation, marketing, knowledge sharing, employment opportunities, networking, and the creation of project groups. Based on these findings, the study recommends that professional bodies enhance awareness by organizing conferences, seminars, and meetings to discuss the applications and benefits of social media tools in construction projects. Additionally, project consultants should be encouraged to recommend appropriate social media tools to project bidders. Governments and policymakers should consider incentivizing effective users of these tools within the construction sector. Lastly, academics should be encouraged to devote more research efforts to exploring the specific applications, benefits, and challenges of adopting social media tools in the construction industry.

**Keywords:** Construction industry; Developing countries; Project management; Social media; Sustainability

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### INTRODUCTION

The construction industry plays a huge role in the development of most developed and developing countries through infrastructure development, which helps the socio-economic life of citizens by creating jobs and increasing Gross Domestic Product (GDP) (Igwe and Ude, 2018). AsokoInsight (2019) reported a construction boom in Rwanda, with revenues from the sector rising by over 60% since 2012, and by 2018, earnings reached 560.5 million dollars, equaling 6.2% of GDP and 38.2% of the total industrial sector's income. Despite these contributions, Zhong *et al.* (2021) noted that the sector requires the application of critical managerial practices to improve efficiency and meet

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\* Corresponding author: [oluwaseundosumu97@gmail.com](mailto:oluwaseundosumu97@gmail.com)

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the ever-growing demand for infrastructural facilities. However, Nweze (2016) affirmed that the absence of vital tools and media for effective communication has negatively impacted the construction industry and has contributed to many failed infrastructure projects. Consequently, Noor *et al.* (2021) identified social media (SM) as one of the communication tools to achieve effective communication in construction project management.

SM is an innovative drive that improves the way businesses operate; through its use, companies can transform service delivery and increase productivity, ultimately leading to higher profits (Azhar and Abeln, 2014). Afolabi and Oyeyipo (2017) noted that the construction industry has been predominantly traditional in its operations; however, it is rapidly changing and embracing innovative information and communication technologies. Yilmaz (2020) argued that the slow adaptation in the construction industry is generally due to stakeholders' reluctance to use new technologies like SM to change traditional business habits. Iliescu (2020) mentioned that classical communication methods are being replaced by new ones in the construction industry, as is happening in other sectors. Akande *et al.* (2018) discovered that project managers, who are at the forefront of problem-solving and decision-making, are often reluctant to adopt SM. Hysa and Spalek (2019) emphasized that project managers need to understand which SM tools are effective and how and when to adopt them for optimal performance on construction projects.

The study by Ojelabi *et al.* (2018) indicated that the adoption of web-based and digital technologies such as SM is still in its infancy in the Nigerian construction industry due to various factors. The adoption of SM for construction project management creates and introduces easier and more effective methods to ensure that project managers achieve their goals (Ozumba and Shakantu, 2018). While Mahoney and Tang (2018) claimed that the adoption of SM tools in the United States is high, the level of adoption in developing countries remains unclear.

The construction industry is one of the sectors that play a critical role in everyone's daily life, to the extent that some argue that without the construction industry, many other sectors could not exist. This poses a significant responsibility on the construction industry to ensure that it remains innovative and competitive in its performance. Perera *et al.* (2017) argue that the adoption of SM in the construction industry cannot be expected to match that of other sectors such as health and beauty, which utilize SM for recruitment, or the food and drink industry, which employs SM to enhance brand image and attract followers. Noor *et al.* (2021) established that even though the construction sector has adopted SM tools, construction professionals do not fully maximize the benefits these tools provide.

SM is becoming a powerful information and communication technology; however, its adoption in the construction industry has been limited because stakeholders are

accustomed to traditional practices and are resistant to change (Azhar and Abeln, 2014). SM was described by Leidner *et al.* (2018) as a tool that can facilitate the swift integration of new employees. However, the study by Cullen and Leavy (2017) indicates that there is scant literature concerning the adoption of SM for construction project management. SM should be utilized to enhance communication among stakeholders, market construction companies, recruit potential workers, boost profits, and manage knowledge sharing (Daemi *et al.*, 2020). Many stakeholders use the internet for personal reasons, but SM tools are not widely used for professional purposes (Prebanić and Vukomanović, 2021).

Construction organizations need to develop strategies to ensure sustainable project management. They must analyze the SM tools that are effective for their goals and develop mechanisms to promote SM adoption in their operations. Iliescu (2020) noted that many construction professionals struggle to identify or name the SM channels adopted by their organizations. Hysa and Spalek (2019) found that only 41% of their respondents' organizations use social networks like Facebook for construction operations. Al-Shehan and Assbeihat (2021) discovered that people aged 20-35 use SM at work for less than one hour, while those aged 51-60 use SM for 5-8 hours daily. Iliescu (2020) found that only one of the nine companies investigated had a website, while only four had Facebook accounts. In Malaysia, Noor *et al.* (2021) ranked Facebook (93%) as the second most used SM tool at work after WhatsApp (98%). Instagram had 76%, Twitter 65%, YouTube 38%, LinkedIn 41%, Tumblr 16%, and Pinterest 9.5%.

Similarly, Etemadi *et al.* (2022) found that WhatsApp was the most adopted SM tool for knowledge sharing due to its privacy features, while tools like Facebook, Instagram, and LinkedIn were also used, mainly for marketing and advertisement purposes. These findings indicate that social networking is being adopted by construction professionals in Malaysia. Al-Shehan and Assbeihat (2021) could not determine the level of adoption of SM tools for construction project management in Jordan but noted that 84% of their respondents' organizations do not regulate the use of SM in their operations. Ojelabi *et al.* (2018) affirmed that construction organizations in Nigeria are present on some SM platforms, such as websites, Facebook, and LinkedIn, but they rarely adopt them. While they have access to other tools such as WordPress, Instagram, Twitter, social bookmarking sites, YouTube, Blogger, Snapchat, Pinterest, Flickr, Yammer, and Vimeo, they do not utilize them for socio-client relationship management. Perera *et al.* (2017) identified that over 90% of the 15 construction companies investigated in the United Kingdom had adopted Twitter and LinkedIn accounts, and 65% had Facebook accounts for construction project management. YouTube, blogs, and Pinterest were rarely used. Yilmaz (2020) confirmed that the most frequently used SM tools for construction project management were Instagram (58%), Facebook (20%), Twitter (12%), Pinterest (9%), and YouTube (3%). Pivec and Maček (2019) noted that construction organizations obtain project information through SM tools like Facebook (53%), LinkedIn (42%), Twitter (29%), SlideShare (15%), YouTube (14%), and

Instagram (2%). Additionally, 35% affirmed that the information from SM tools is reliable.

Twenty-seven SM tools have been identified in the literature as applicable for project management in the construction industry. This section of the paper concentrates on the application of the identified SM tools for construction project management. Pivec and Maček (2019) noted that while microblogging tools were never used by construction organizations, 52% of construction organizations used SM tools to communicate with human resources, project stakeholders, and customers but did not utilize them for scope and procurement management. Kanagarajoo *et al.* (2019) established that six out of the ten SM tools investigated were frequently used for construction project management, including information sharing, risk management, and cost management. Haji *et al.* (2021) investigated the effectiveness of SM on engineering tasks and concluded that 70% of respondents use SM tools as their primary source of knowledge, with males (73%) and engineers under 25 years (73%) being the greatest users.

Amade (2017) affirmed that project managers utilize different SM tools, such as Facebook, to develop project-specific pages for marketing, highlight important activities, and provide status updates. Wikis like Wikipedia can be used to store and share corporate knowledge and insights, upload brief information in the form of videos to relate important project milestones, highlight critical features, promote project objectives, seek user responses, and provide training. LinkedIn can be utilized to form project groups for disseminating status updates and discussing features among stakeholders. Blog articles can be used for communication and discussion of topics that may seem inappropriate for Facebook, LinkedIn, or Twitter and can serve as an online meeting tool for individuals with similar interests. Etemadi *et al.* (2022) discovered that 98% of the respondents preferred to use private SM tools (for knowledge sharing, marketing, and advertisements in Australia) over enterprise and public SM tools. Ojelabi *et al.* (2018) established that SM tools such as websites, Facebook, and LinkedIn are explored by construction organizations to effectively relate with clients but are rarely used for social client relationship management. Adebisi *et al.* (2018) suggested that construction organizations adopt SM tools such as Twitter, Instagram, YouTube, and social bookmarking sites to interact with clients but do not fully capitalize on them; Snapchat, Pinterest, Flickr, Yammer, and Vimeo are rarely explored by construction organizations.

Yilmaz (2020), while tracking the future role of SM in construction and project management, discovered that SM is frequently and effectively used to become aware of current developments, access and share information, and join professional groups on SM. Hysa and Spalek (2019) concluded that SM is primarily used to manage project teams, communications, and project promotion. The areas of SM tool application were investigated by Noor *et al.* (2021) using three cases. Respondents in CASE A used SM tools for business development, knowledge management, marketing/advertising, finding

and sharing information, sharing e-mail, exchanging documents, gaining competitive advantage, and industry awareness. Respondents in Case B identified that SM tools are used as potential recruitment tools, media for meeting prospective clients, and attracting new projects. Respondents in Case C noted that SM provides a competitive advantage over inactive competitors, raises brand awareness, facilitates promotions, circulates job opportunities, markets the company's brand and profile, allows for teleconferencing and virtual meetings, and supports online purchasing services to reach a large audience.

Perera *et al.* (2017) asserted that SM tools help connect target audiences, such as clients, contractors, and prospective employees, encourage cooperation within groups, expedite specialist feedback, improve brand image, and facilitate knowledge management. Ahmed *et al.* (2019) opined that SM tools can be utilized to manage disaster situations. Pozin (2014) posits that the WhatsApp application can serve as an information storage and sharing tool, a project monitoring tool, a problem-solving tool, and a means to engage project teams in Malaysia. The study by Iliescu (2020) indicated that even if construction organizations do not associate SM with higher sales or customer reach, it is still considered a central tool for communication with customers and advertising products and services.

Al-Shehan and Assbeihat (2021) explained that SM tools are used by project managers for project communication, sourcing project information, personal communication, staying updated on project developments, sharing pictures and videos related to a project with the project team, information sharing, and conducting and attending fast and easy training courses. However, respondents expressed concerns about its capacity to store information safely without potential leakage. Daemi *et al.* (2020) identified that SM tools are used for project management to manage requirements and configuration, communicate with the management team, formulate policies, manage knowledge, and collaborate with project stakeholders. Prebanić and Vukomanović (2021) concluded that SM is an effective tool for engaging public and community stakeholders, internal communication, and analyzing external stakeholders.

In summary, the level of adoption of SM tools in the construction industry is quite low compared to other industries, such as the health sector. Therefore, it is recommended that studies on the application of SM tools in the construction industry be encouraged. Literature further reveals that the construction industry in developed nations adopts SM tools for construction project management more readily than their counterparts in developing countries; however, the benefits of their application have yet to be maximized. In light of this, it is suggested that effective application strategies be developed to ensure sustainable project management. These strategies may involve analyzing the SM tools that could be effective for organizational goals. From the foregoing, it is apparent that SM tools are being adopted in the construction industry of both developed and developing nations to facilitate project management. What remains unclear is the level of awareness, adoption, and application of SM tools for construction project management, particularly in developing countries. Therefore, the problem of this

study (a gap in knowledge) is the lack of empirical data to substantiate the level of awareness, adoption, and application of SM tools for construction project management. The results of this study will provide a basis for further research on SM tools and their application for specific purposes in construction projects. Moreover, this study will complement existing research on SM by offering recommendations for the effective utilization of SM tools in construction project management. Without such a study, it may be challenging to establish the impact of SM tools on the performance (cost, time, quality, and sustainability) of construction projects and to understand the challenges associated with the application of SM tools for construction project management. Therefore, this study investigates the level of awareness, adoption, and application of SM tools for construction project management.

## MATERIALS AND METHODS

The survey research design was employed to conduct this study. A closed-ended questionnaire was used to gather relevant information from participants. The study population comprised construction stakeholders, specifically consultants and contractors in Kigali, who have adopted social media (SM) tools for project management within the Rwandan construction industry. While clients are a significant stakeholder group capable of providing valuable data, they were excluded from the study due to challenges in accessing them and the lack of organized information regarding construction clients in the area. However, this exclusion is not expected to adversely affect the study's outcomes, as clients are typically represented on construction projects by consultants, including architects, engineers, and quantity surveyors.

The respondents were limited to stakeholders directly involved in the construction phase of projects, as the focus of the study is on construction project management. Rwanda was chosen for this research because it is one of the fastest-growing economies in Africa, with a growth rate exceeding 6% of its Gross Domestic Product (GDP). Most construction activities are concentrated in Kigali, the capital city, which serves as the central business district and economic hub, hosting the headquarters of numerous contractors and consultants. Therefore, construction consultants and contractors based in Kigali were selected as the primary data sources for this study, as their insights could effectively represent other developing nations with similar characteristics.

The consultants consist of engineers (civil, structural and service), architects, and quantity surveyors. The list of registered engineers (1,537 members) in Rwanda as of 2022 was obtained from the website ([https://engineersrwanda.rw/documents/ier\\_documents/Annual\\_Report.pdf](https://engineersrwanda.rw/documents/ier_documents/Annual_Report.pdf)) of the Institute of Engineers in Rwanda (IER). The list of registered architects and quantity surveyors (148 and 62 members, respectively) in Rwanda as of 2022 was obtained from the website (<https://ria.rw/member-directory/>) of the Rwanda Institute of Architects

(RIA). The list of contractors (102) in Rwanda was obtained from the Rwanda Development Board (RDB). The study adopted the stratified sampling technique to execute the study. Using Slovin's formula on the data collected from IER, RIA and RDB, the sample size for the study is 94 engineers, 58 architects, 38 quantity surveyors and 47 contractors (represented by in many occasions by project managers, site engineers, site supervisors, etc.). Hence the population of the study is 1849 and the sample size is 243. The Slovin's formula (Slovin, 1960) is written as:

$$n = \frac{N}{(1 + N \cdot e^2)}$$

where n = Sample size (243); N = Population of the study (1849); and e = Margin of error (10%).

The questionnaire for the study was divided into two sections. Section one aims to obtain the biographical data of the respondents and their organisations. Section two contains five questions on SM tools for construction project management. Each question in section two has subfactors that were meant to be rated by the respondents based on a five-point Likert scale. Section two covers questions such as the level of awareness, adoption, and application of SM to construction project management. Awareness was measured using NA (1) – Not Aware, SA (2) – Slightly Aware, AA (3) – Averagely Aware, A (4) – Aware, VA (5) – Very Aware. Adoption was measured with NA (1) – Not Adopted, SA (2) – Slightly Adopted, AA (3) – Averagely Adopted, A (4) – Adopted, WA (5) – Well Adopted. The application of SM was measured with NH (1) – Not High, SH (2) – Slightly High, AH (3) – Averagely High, H (4) – High, VH (5) – Very High.

The questionnaire for the study was distributed using Google Forms. The link for the questionnaire was shared basically via WhatsApp and emails to the respondents. The data for the study were analysed with descriptive and inferential statistics. The descriptive statistics were frequency and percentages. The inferential statistics were mean scores, correlations and the Mann-Whitney U test.

Out of the 243 questionnaires distributed, 116 were completed and returned, resulting in a response rate of 48 percent. All analyzed questionnaires were deemed valid, as respondents of incomplete questionnaires were contacted to fill in the missing information. Additionally, some respondents were invited to clarify unclear areas through unstructured interviews. A response rate of 48 percent, while relatively high, is not uncommon in questionnaire surveys within the construction industry, particularly those conducted online.

For example, Dosumu and Onukwube (2013) reported a response rate of 21% in their analysis of project success criteria; Bamgbade *et al.* (2016) achieved a response rate of 25% in their study on construction firms' sustainability compliance; and Kineber *et al.* (2024) obtained a response rate of 37% from an online survey investigating the critical application areas of Radio Frequency Identification (RFID) in construction. Edwards (2024) noted that response rates of 20 to 25 percent are generally considered acceptable

for online surveys. Wu *et al.* (2022) further supported this view, stating that surveys with smaller sample sizes (i.e., less than 500) require response rates of 20% to 25% to yield reliable estimates.

## RESULTS AND DISCUSSION

Table 1 presents the demographic data of the respondents and their organizations for this study. The sample included a higher proportion of male participants (63.80%) compared to female participants (36.20%). Most respondents were aged between 26–40 years (60.30%) and 18–25 years (36.20%). The professionals who participated in the study were fairly evenly distributed: 43.10% were civil, structural, or mechanical engineers; 25.86% were quantity surveyors; 10.35% were architects; and 12.07% were construction, project, or quality managers. Additionally, a significant majority (75.9%) of the respondents were employed by consulting organizations.

Furthermore, a substantial 79.31% of respondents held a bachelor's degree, and 46.55% were members of the Institution of Engineers in Rwanda. The majority of respondents (36.20%) reported having between 1 and 3 years of work experience. These results indicate that the respondents are well-qualified—considering their professions, types of projects handled, organizational sectors, academic qualifications, professional memberships, and work experience—to provide reliable insights into the level of awareness, adoption, and application of social media tools for construction project management.

Table 2 illustrates the respondents' level of awareness regarding social media (SM) tools applicable for construction project management. The findings indicate that respondents were "very aware" of only the WhatsApp tool (mean score of 4.67), "aware" of twenty other SM tools investigated in the study, and "moderately aware" of Dropbox as a potential tool for construction project management. In contrast, contractors did not report being "very aware" of any SM tool for construction project management; instead, they were "aware" and "slightly aware" of 18 SM tools (nine in each category). The ranking for consultants mirrored the overall ratings, likely due to the larger number of consultants who contributed to the study.

Using the Mann-Whitney U test, a significant difference ( $p < 0.05$ ) was found in the level of awareness of fifteen SM tools for construction project management between consultants and contractors. However, there was no significant difference ( $p > 0.05$ ) in the level of awareness of six specific tools (Facebook Messenger, Instagram, LinkedIn, Twitter, Skype, and Telegram) between the two groups.



Table 1. General information of the respondents

Information	Option	Frequency	Percentage
Gender	Male	74	63.80
	Female	42	36.20
Age	18-25	42	36.20
	26-40	70	60.30
	41-65	4	3.40
Profession	Civil/Structural/Mechanical engineer	50	43.10
	Quantity Surveyor	30	25.86
	Architect	12	10.35
	Project/Construction/Quality Manager	14	12.07
	Land Surveyor/Transport engineer	10	8.62
Type of organization	Consultant	88	75.90
	Contractor	28	24.10
Type of projects handled (multiple options could be ticked)	Road	64	34.78
	Commercial building	36	19.57
	Institutional building	34	18.48
	Residential buildings	28	15.21
	Factory/Power plant buildings	22	11.96
Highest academic qualification	Masters	16	13.79
	Bachelors	92	79.31
	Diploma	8	6.90
Professional qualification	Institution of Engineers (IER)	54	46.55
	Rwanda Institute of Architects (RIA)	26	22.41
	Rwanda Institute of Quantity Surveying (RIQS)	28	24.14
	Project Management Professional (PMP)	4	3.45
	Others	4	3.45
Work experience	1-3 years	42	36.20
	4-6 years	38	32.80
	7-9 years	16	13.80
	10 years and above	20	17.20

Table 3 indicates the level of adoption of SM tools by consultants and contractors for construction project management. It was discovered that WhatsApp (4.74) was “well adopted”, nineteen SM tools were “adopted”, and Slide share and Dropbox were “averagely adopted” by the respondents of the study. It was observed that the pattern of ranking of the level of awareness of the application of SM tools for construction project management is like that of the level of adoption of SM tools for construction project management.

Further, Mann-Whitney U test indicates that there is no significant difference ( $p > 0.05$ ) in the level of adoption of nine (Youtube, Twitter, Snapchat, Facebook, Instagram,

LinkedIn, Facebook Messenger, Tik Tok and Quora) SM tools for construction project management. However, there is a significant difference ( $p < 0.05$ ) in the level of adoption of thirteen SM tools for construction project management.

Table 1. Awareness of the application of SM tools for construction project management

SM Tools	Contractor Mean	Rank	Consultant Mean	Rank	Overall Mean	Overall Rank	Decision	<i>p</i> Value
WhatsApp	4.21	1	4.82	1	4.67	1	VA	0.000
Facebook	3.93	4	4.36	2	4.26	2	A	0.036
YouTube	3.86	5	4.36	2	4.24	3	A	0.014
Facebook Messenger	4.00	2	4.30	4	4.22	4	A	<b>0.260</b>
Instagram	3.86	5	4.30	4	4.19	5	A	<b>0.142</b>
LinkedIn	3.79	7	4.30	4	4.17	6	A	<b>0.066</b>
Twitter	4.00	2	4.16	8	4.12	7	A	<b>0.449</b>
Snapchat	3.43	10	4.30	4	4.09	8	A	0.001
Skype	3.50	8	4.02	10	3.90	9	A	<b>0.074</b>
Telegram	3.50	8	3.95	14	3.84	10	A	<b>0.162</b>
TikTok	3.07	11	4.02	10	3.79	11	A	0.010
Yahoo Messenger	2.93	12	3.91	17	3.67	12	A	0.004
Houzz	2.43	18	4.05	9	3.66	13	A	0.002
Quora	2.79	13	3.93	15	3.66	13	A	0.015
Tagged	2.43	18	4.02	10	3.64	15	A	0.001
Vine	2.43	18	3.98	13	3.60	16	A	0.001
Tumblr	2.57	16	3.93	15	3.60	16	A	0.007
Pinterest	2.64	14	3.89	18	3.59	18	A	0.005
Flickr	2.64	14	3.80	20	3.52	19	A	0.021
SlideShare	2.50	27	3.82	20	3.50	20	A	0.009
Dropbox	2.29	21	3.75	21	3.40	21	AA	0.003

<1.5 = Not Aware (NA), 1.5 – 2.49 = Slightly Aware (SA), 2.5 – 3.49 = Averagely Aware (AA), 3.5 – 4.49 = Aware (A), and 4.5 and above = Very Aware (VA)

Table 3. Adoption of SM tools for construction project management

SM tools	Contactors Mean	Rank	Consultants Mean	Rank	Overall Mean	Overall Rank	Decision	<i>p</i> value
WhatsApp	4.50	1	4.82	1	4.74	1	WA	0.025
YouTube	4.07	4	4.32	3	4.26	2	A	<b>0.279</b>
Twitter	4.07	4	4.27	6	4.22	3	A	<b>0.387</b>
Snapchat	3.79	8	4.34	2	4.21	4	A	<b>0.118</b>
Instagram	3.86	6	4.30	4	4.19	5	A	<b>0.222</b>
LinkedIn	3.86	6	4.30	4	4.19	5	A	<b>0.174</b>
Facebook	4.14	2	4.20	7	4.19	5	A	<b>0.709</b>
Facebook Messenger	4.14	2	4.16	8	4.16	8	A	<b>0.915</b>
Skype	3.36	9	4.09	9	3.91	9	A	0.022
Telegram	3.29	10	4.07	10	3.88	10	A	0.024
TikTok	3.29	10	3.86	18	3.72	11	A	<b>0.166</b>
Houzz	2.57	15	4.02	11	3.67	12	A	0.009
Flickr	2.57	15	4.00	12	3.66	13	A	0.008
Vine	2.57	15	4.00	12	3.66	13	A	0.008
Tumblr	2.50	18	4.00	12	3.64	15	A	0.003

Tagged	2.43	20	3.98	15	3.60	16	A	0.001
Quora	2.79	12	3.86	18	3.60	16	A	<b>0.059</b>
Pinterest	2.64	13	3.89	16	3.59	18	A	0.023
Yahoo	2.64	13	3.89	16	3.59	18	A	0.008
Messenger								
SlideShare	2.43	20	3.80	20	3.47	20	AA	0.009
Dropbox	2.50	18	3.75	21	3.45	21	AA	0.019

<1.5 = Not Adopted (NA), 1.5 – 2.49 = Slightly Adopted (SA), 2.5 – 3.49 = Averagely Adopted (AA), 3.5 – 4.49 = Adopted (A), and 4.5 and above = Well Adopted (WA)

The level of application of the identified SM tools for various purposes in construction project management is presented in Table 4. The application areas of the SM tools were obtained through a critical review of existing literature on the role of SM in the construction industry. Thus, the consultants and the contractors collectively noted that their level of application of SM tools for the identified twenty-four areas of construction project management is “high”. This rating is like the independent rating of the consultants (High) and the contractors (High). Therefore, the Mann-Whitney U test indicates that except in marketing ( $p = 0.046$ ), building networks with peers around the world ( $p = 0.008$ ), promoting the project ( $p = 0.046$ ), training interested parties (0.029), ensuring a high level of cooperation between project team members, stakeholders, and managers (0.024), and creating interest in your line of work by the outside world (0.016), there is no significant difference in the level of application of SM tools for project management ( $p > 0.05$ ). The reason for the significant differences in the four application areas of SM tools for construction project management despite the similar independent rating (high) by the consultants and the contractors is not known.

Table 4. Application areas of SM tools for construction project management

Application areas	Cont	R	Cons	R	Total	R	Decision	<i>p</i> -value
Information exchange between all members of the project team.	4.29	5	4.20	1	4.22	1	H	<b>0.821</b>
Storage of information	4.43	2	4.07	3	4.16	2	H	<b>0.104</b>
Creating areas of cooperation for the departments of companies, individuals and for work in the implementation of projects, exchange of experience	4.07	14	4.07	2	4.07	3	H	<b>0.992</b>
Documentation and storage of useful information about the ongoing project	4.21	11	4.02	5	4.07	4	H	<b>0.410</b>
Marketing	4.43	2	3.93	9	4.05	5	H	0.046
Sharing Knowledge between Project members	4.36	4	3.93	8	4.03	6	H	<b>0.065</b>
Hiring workers	4.00	17	4.05	4	4.03	6	H	<b>0.908</b>
Building networks with peers around the world	4.50	1	3.86	12	4.02	8	H	0.008
Allowing the creation of project groups, quickly exchanging information in a group, regardless of the place of work and submitting ideas through the groups	4.14	13	3.95	6	4.00	9	H	<b>0.341</b>
Informing the public about the progress of	4.14	12	3.93	10	3.98	10	H	<b>0.304</b>

the project								
Establishing contacts with potential clients and contractors	4.00	17	3.95	7	3.97	11	H	<b>0.772</b>
Motivating employees to participate more in corporate events.	4.29	6	3.84	13	3.95	12	H	<b>0.074</b>
Establishing basic communication procedures by providing useful, objective, and reliable information to other parties	4.00	17	3.89	11	3.91	13	H	<b>0.550</b>
Promoting the Project	4.21	9	3.77	17	3.88	14	H	0.046
Conducting teleconferences and video conferences while working on projects	4.00	15	3.84	13	3.88	15	H	<b>0.433</b>
Training interested Parties	4.21	9	3.75	18	3.86	16	H	0.029
Ensuring a high level of cooperation between project team members, stakeholders, and managers	4.29	8	3.73	19	3.86	17	H	0.024
Better decision making	4.00	15	3.80	15	3.84	18	H	<b>0.365</b>
Creating interest in your line of work by the outside world	4.29	6	3.68	22	3.83	19	H	0.016
Expanding client networking and getting feedback from the client	3.93	22	3.80	16	3.83	20	H	<b>0.492</b>
Linking with potential partners	3.93	20	3.70	21	3.76	21	H	<b>0.289</b>
Management of disaster situations	3.93	20	3.64	23	3.71	22	H	<b>0.166</b>
Improving self-qualifications and allowing effectiveness in supporting the activities of the organization	3.50	24	3.73	19	3.67	23	H	<b>0.422</b>
Raising Creativity in Project Stakeholders	3.64	23	3.61	24	3.62	24	H	<b>0.881</b>

<1.5 = Vey Low (VL), 1.5 – 2.49 = Low (L), 2.5 – 3.49 = Averagely High (AH), 3.5 – 4.49 = High (H), and 4.5 and above = Vey High (VH)

## DISCUSSION

The study investigated the level of awareness, adoption, and application of social media (SM) tools for construction project management. While previous research has examined the impacts of adopting formal communication tools within the construction industry, the awareness and adoption of SM tools have been less frequently explored. Understanding the adoption levels of SM tools is crucial for assessing their impact on project management.

The results indicate that respondents are aware (but not "very aware") of the application of SM tools for managing construction projects. The top tools identified include WhatsApp, Facebook, YouTube, Facebook Messenger, Instagram, LinkedIn, Twitter, Snapchat, Skype, and Telegram. However, the level of awareness of these tools significantly differs between contractors and consultants, with the exception of Facebook, Facebook Messenger, Instagram, LinkedIn, Twitter, Skype, and Telegram. It is not surprising that both groups recognize the potential applications of SM tools, as these tools have been utilized in various industries beyond construction and for informal communications in everyday life. However, the reasons for the observed differences in awareness between contractors and consultants were not explored in this study and

warrant further investigation, as it may reveal whether certain SM tools are more beneficial for one group over the other.

Furthermore, WhatsApp is notably adopted by respondents for construction project management, whereas other SM tools are used to a lesser extent. This suggests that respondents are more comfortable using WhatsApp for communication compared to other platforms. The trends in awareness and adoption of SM tools are closely aligned, indicating that greater awareness corresponds with higher adoption rates. Similar to the awareness findings, there is a significant difference in the level of adoption of SM tools for construction project management, except for WhatsApp. Tools such as YouTube, Twitter, Snapchat, Facebook, Instagram, LinkedIn, Facebook Messenger, and TikTok exhibit varying levels of adoption. The reasons for the differences in adoption levels between contractors and consultants were not investigated in this study and could benefit from further exploration.

These findings align with those of Hysa and Spalek (2019), Iliescu (2020), Noor *et al.* (2021), and Etemadi *et al.* (2022), who reported that WhatsApp, Facebook, Instagram, Twitter, and YouTube are frequently and informally adopted by construction professionals for project management. However, they contrast with the findings of Perera *et al.* (2017), Pivec and Maček (2019), Yilmaz (2020), and Noor *et al.* (2021), which suggested that tools like LinkedIn, Tumblr, Instagram, Twitter, YouTube, Facebook, blogs, and Pinterest are rarely used in facilitating construction project execution. Furthermore, Ojelabi *et al.* (2018) noted that while many organizations have these SM tools available, they often do not utilize them for various reasons. This implies that underlying challenges may hinder the effective and efficient adoption of SM tools in construction project management. Additionally, it suggests that the adoption of SM tools varies significantly across different organizations and regions. To promote broader adoption, the concerns of construction organizations (both contractors and consultants) must be adequately addressed. However, the reasons for these variances in SM tool application across organizations and regions were not explored in this study.

The respondents' organizations reported high usage of SM tools across all identified application areas for construction project management. The most frequently rated uses of SM tools include information exchange, information storage, fostering organizational collaboration, marketing, knowledge sharing, recruitment, networking, and forming project groups. Conversely, the least-rated uses involve linking with potential partners, managing disaster situations, enhancing self-qualifications, supporting organizational activities, and fostering creativity among project stakeholders. These results suggest that SM tools are more beneficial for information and communication management, marketing, recruitment, and collaboration, while their application for more consequential activities like risk management, training, and partner engagement is less pronounced. Despite the high overall application of SM tools in construction project management, significant differences exist between contractors and consultants regarding their use for marketing, networking, stakeholder collaboration, and gaining external

interest in projects. This indicates that one group may be leveraging SM tools more effectively for these purposes than the other. Again, the reasons for these differences were not investigated in this study and would benefit from further inquiry.

Since all application areas examined received high ratings from respondents, the results align with previous research identifying various application areas for SM tools in construction (Amade, 2017; Perera *et al.*, 2017; Ojelabi *et al.*, 2018; Adebisi *et al.*, 2018; Pivec and Maček, 2019; Kanagarajoo *et al.*, 2019; Hysa and Spalek, 2019; Ahmed *et al.*, 2019; Iliescu, 2020; Yilmaz, 2020; Daemi *et al.*, 2020; Prebanić and Vukomanović, 2021; Noor *et al.*, 2021; Haji *et al.*, 2021; Al-Shehan and Assbeihat, 2021).

## CONCLUSION

This study investigated the level of awareness, adoption, and application of social media (SM) tools for construction projects in developing economies. The findings revealed that 68-85% of construction organizations were “aware” that 26 out of the 27 SM tools examined could be utilized for construction project management. Notably, 93% of respondents were “very aware” of WhatsApp’s applicability in this context. The top SM tools recognized by respondents for managing construction projects included WhatsApp, Facebook, YouTube, Facebook Messenger, Instagram, LinkedIn, Twitter, Snapchat, Skype, and Telegram. However, the level of awareness significantly differed between contractors and consultants for all tools except Facebook, Facebook Messenger, Instagram, LinkedIn, Twitter, Skype, and Telegram.

Further analysis indicated a direct correlation between the level of awareness and the level of adoption of SM tools for construction project management. This suggests that as awareness of SM tools increases among construction organizations, so too does their adoption. Therefore, to enhance the adoption rates of these tools, it is essential to simultaneously improve awareness of their applicability in construction management. Similar to the awareness findings, there was a significant difference in the adoption levels of SM tools between consultants and contractors, except for WhatsApp, with significant variances observed for YouTube, Twitter, Snapchat, Facebook, Instagram, LinkedIn, Facebook Messenger, and TikTok.

Moreover, the adoption of SM tools for construction project management varies not only from organization to organization but also across different regions, as indicated by the study’s findings and comparisons with previous research. The respondents’ organizations reported high application of SM tools for various purposes, with the most common applications being information exchange, information storage, fostering organizational collaboration, marketing, knowledge sharing, recruitment, networking, and the creation of project groups. Previous studies have identified the benefits of adopting SM tools in construction, highlighting the need for stakeholders—including construction

professionals, professional bodies, and academia—to promote awareness of these benefits.

It is important to emphasize that the application of SM tools is not intended to replace traditional communication methods but to complement them, thereby enhancing effective construction project management practices. Professional bodies should increase awareness by organizing conferences, seminars, and general meetings focused on the application and benefits of SM tools for construction projects. Project consultants can recommend relevant SM tools to bidders for construction project management, while government policymakers may provide incentives to encourage effective use of SM tools in construction. Additionally, academia should be encouraged to focus research efforts on the specific applications, benefits, and challenges associated with SM tool adoption.

This study lays a foundation for further research on the application of SM tools for construction project management, particularly within the construction industries of developing countries. It recommends more in-depth investigations into the significant differences in awareness, adoption, and application levels of SM tools. Furthermore, it advocates for the use of advanced statistical methods, such as structural equation modeling and system analysis, to explore the holistic relationships among the constructs of awareness, adoption, and application. Given the varying levels of adoption and application across different organizations and regions, there are likely distinct challenges—including resistance to change—that influence the application of SM tools. Therefore, further studies should be conducted to examine the organizational and regional challenges associated with adopting SM tools for construction project management. Lastly, this study provides a basis for future research on the specific uses of the various SM tools investigated.

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## DECLARATIONS

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