

Effectiveness of Social Media Platforms as a Reporting Tool in Disaster and Incident Response of the Department of Public Works and Highways, Region III

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Abstract. This study examines the effectiveness of social media platforms as reporting tools for disaster and incident response within the Department of Public Works and Highways (DPWH), Region III. Through a mixed-methods approach, demographic profiles of clientele and DPWH Public Information Officers (PIOs) were analyzed alongside reports received and perceived effectiveness of social media platforms. Purposive sampling was employed to gather responses from 13 clienteles and 33 DPWH PIOs. The demographic analysis revealed that clienteles primarily aged between 25 and 44 years old, with a majority having attained graduate or college degrees and residing in urban areas. DPWH PIOs predominantly fell within the 25 to 34 age range, with most being college graduates and contract-of-service employees. Despite variations in demographics, both clienteles and PIOs perceived social media platforms as effective tools for disseminating information and addressing concerns related to disaster and incident response. Reports received by DPWH Region III through social media platforms highlighted various infrastructure-related issues, including road erosion, drainage problems, and impassable roads due to heavy rainfall. Actions taken in response to these reports included cleaning operations, patching of potholes, and requesting additional funding for infrastructure projects. The perceived effectiveness of social media platforms varied among different demographic groups but generally leaned towards positive evaluations. Challenges encountered in the use of social media as reporting tools included managing the volume of information, ensuring data accuracy and verification, addressing data privacy and security concerns, and managing public expectations. Despite these challenges, both clienteles and PIOs emphasized the importance of social media platforms in facilitating timely communication and response during disaster and incident scenarios.

Keywords: Disaster Management; Infrastructure Maintenance; Public Administration; Social Media Platforms; Reporting Tools

1. Introduction

Social media platforms like Facebook, Twitter, Instagram, and others have revolutionised the way people share information. Its impact extends to personal relationships, business interactions, and public administration. Government agencies are gradually embracing technologies to enhance transparency and trust, facilitate citizen participation in public matters, and improve collaboration between organisations. To adapt to advancements in social computing, the Department of Public Works and Highways issued a policy acknowledging the importance of social media networking in promoting good governance through digital interactions with the general public. The primary objective is to raise

awareness regarding the Department's achievements. The Stakeholders Relations Service - Stakeholders Affairs Division manages official social media platforms such as Facebook and Twitter at the Central Office; regional offices may also create their own accounts under this policy. The influence of social media on public administration has given citizens new channels for feedback and increased their role in the policy-making process. The implementation of Republic Act No. 10121, also known as the "Philippine Disaster Risk Reduction and Management Act of 2010", has led to the involvement of the Department of Public Works and Highways in government initiatives on disaster risk reduction management in the Philippines. DPWH, as the engineering arm of the government, is responsible for overseeing infrastructure facilities such as national roads and bridges which are crucial for all aspects of disaster management: prevention and mitigation, preparedness, response and early recovery, as well as rehabilitation and recovery. The ultimate goal is to build safe, adaptable, and disaster-resilient Filipino communities contributing to sustainable development. To handle preparedness activities effectively DPWH set up Disaster and Incident Management Teams in various offices tasked with establishing Emergency Operation Centers, managing communication channels for reports submission; developing evacuation plans; prioritizing salvage efforts; coordinating team resources during responses using social media platforms like Facebook & Twitter aiming at public safety prioritization due to their direct impact from project-related issues. The researcher suggests studying Social Media Platforms' effectiveness as a reporting tool for Disaster & Incident Response strategy optimization while minimizing possible risks within DPWH Region III. This study aims to assess the effectiveness of social media platforms as a reporting tool in Disaster and Incident Response of DPWH, Region III. The focus of this study is on the utilization of social media platforms for the implementation of infrastructure projects, specifically national roads, bridges, and flood control. Specifically, it aims to find answers to the following questions.

1. How may the profile of the respondents be described in terms of Age, Gender, Educational attainment, Economic Status, Employment Status (PIO personnel), and Length of service (PIO Personnel)?
2. How may the Effectiveness of Social Media Platforms as a Reporting Tool in Disaster and Incident Response of the Department of Public Works and Highways, Region III be described in terms of Volume of reports, Number of validated reports, and Number of action taken per report?
3. Is there a significant difference between the profile of the respondents and the Effectiveness of Social Media Platforms as a Reporting Tool in Disaster and Incident Response of the Department of Public Works and Highways, Region III?
4. What are the challenges encountered during implementation of social media platforms as a reporting tool in Disaster and Incident Response of the Department of Public Works and Highways, Region III?
5. What are the possible recommendations of this study?

2. Methodology

This study utilized the descriptive method of research. Descriptive research requires the systematic collection of data pertaining to events, followed by their organization, tabulation, depiction, and description (Glass & Hopkins, 1984). Descriptive studies are designed to determine the current state of affairs, thereby utilizing observational and survey methods as common means of gathering descriptive data (Gall & Borg, 1989).

2.1. Sampling Procedure

The researchers will use a purposive sampling method wherein they have to carefully choose their respondents based on the criteria that suit the research study (Creswell and Creswell, 2018). Furthermore, it is a non-probability type of sampling where the researchers rely on their own judgment in picking the respondents (APA Dictionary of Psychology, 2020) whom they will be surveying.

2.2. Respondents

The respondents of this study are government employees from the DPWH, Region III and designated as a PIO who handle/monitor their social media platforms and who are gathering information and addressing the reports and queries from external stakeholders. The researcher also selected the citizens who have reported incidents or disasters on the social media platform of DPWH, Region III.

3. Results and Discussion

3.1 Demographic Profile of Respondents

3.1.1 Profile of Clientele

A total of 13 clienteles participated in this study. Among the clienteles, there were 5 (38.5%) whose ages were 25 to 34 years old and also 5 (38.5%) were of ages 35 to 44 years old. Meanwhile, some (15.4%) were of ages 45 to 54 years old, and a few (7.7%) were of ages 55 to 64 years old. The data showed that no report was received from clienteles whose ages were 24 years and below and 65 years and above. In terms of gender, 5 (38.5%) of the clienteles were males, 6 (46.2%) were females, while 2 (15.4%) did not disclose their gender. Further, it was also found that a high percentage of the clienteles have earned their graduate degree (46.2%) and college degree (38.5%). Only 2 (15.4%) were high school graduates. Majority of the respondents were employed (92.3%) and only 1 (7.7%) was unemployed. None of the respondents were students or retirees. In terms of location, more than half (61.5%) of the clienteles were residing in urban areas, while only a few lived in the sub-urban (15.4%) and rural (23.1%) areas. In terms of usage of social media as a platform in reporting, majority (92.3%) of the respondents used Facebook while only 1 (7.7%) used E-mail. It was also found that more than of the clienteles (53.8%) have reported only once or twice while some (38.5%) have reported three to four times, and only 1 (7.7%) reported 6 or more times. This showed that Facebook is the most used social media platform among the clienteles which served as a reporting tool for incidents and disasters.

3.1.2 Profile of DPWH PIOs

A total of 33 DPWH PIOs participated in this study. Majority (66.7%) of the PIOs were of ages 25 to 34 years old. There were 4 (12.1%) PIOs whose ages were 18 to 24 years old, 22 3 (9.1%) whose ages were 35 to 44 years old, 2 (6.1%) whose ages were 45 to 54 years old, and 2 (6.1%) whose ages were 55 to 64 years old. Further, there were more female PIOs (51.5%) than males (45.5%). Only 1 (3%) PIO was non-binary. In terms of educational attainment, majority (81.8%) of the PIOs were college graduates while some (18.2%) have earned graduate degrees. It was also found that there were more contract of service PIOs in DPWH Region III (57.6%) compared to permanent PIO employees (42.4%). Lastly, PIOs in DPWH were relatively new in service in which more than half (69.7%) have only been employed for less than a year to 5 years. Some (15.2%) have been in service for six to 10 years while only a few have been employed for 11 to 15 years (6.1%) and more than 15 years (9.1%).

3.2. Reports Received from Social Media Platforms and Actions

The reports received from social media platforms by the DPWH Region III was showed in Appendix A. From June 2022 to September 2023, DPWH Region III received a total of 13 reports sent through social media platforms. The reports contained concerns about the destroyed structures which lead to road erosion, non-functioning draining, impassable roads due to heavy rainfall, clogged and shallow drainages which resulted to flooding, eroded land and riverbanks, and potholes on roads. Based on the data gathered, all (13 out of 13) concerns sent via social media were responded within one (1) week to less than one (1) month. Actions taken include conduct of cleaning operations, and patching of potholes. Additional funding were also requested to cater the concerns of the clientele.

3.3 Effectiveness of Social Media Platform as a Reporting Tool in Disaster and Incident Response of the Department of Public Works and Highways, Region III

3.3.1 Effectiveness Perceived by Clienteles

3.3.1.1 Overall Mean Response and the Extent of Effectiveness of Social Media Platform as a Reporting Tool

Table 1 Mean Response and Level of Effectiveness of Social Media Platform as a Reporting Tool Perceived by Clienteles.

Statement	Mean Response	Verbal Interpretation
Response provided by the DPWH, Region III, on the social media platform properly and efficiently address your concerns.	3.08	Somewhat effective
Social media platform as a reporting tool for disasters and incidents at roads, bridges and flood control of DPWH, Region III.	3.15	Somewhat effective

Posting of current events, disasters, and incidents at roads, bridges, and flood control projects on the DPWH, Region III's social media platform effectively disseminates information to the general public.	3.31	Very effective
Did you find the content/information provided by DPWH, Region III on social media during disaster and/or incident response at roads, bridges and flood control in Region III helpful and informative?	3.31	Very effective
How effective do you find DPWH, Region III's social media platform in providing real-time updates during disaster or incident response at roads, bridges and flood control in Region III.	3.00	Somewhat effective
Overall	3.17	Somewhat effective

According to the data in Table 1, clientele claimed that using social media platforms as a reporting tool for disaster and incident response was somewhat effective with a mean response of 3.17. Particularly, social media platforms were somewhat effective in terms of how properly and efficiently the concerns were addressed, as well as how timely the updates were provided during disasters or incidents. It was notable that social media platforms were very effective in posting current events, disasters, and incidents and disseminating related information to the general public with a mean response of 3.31. Lastly, content provided on social media platforms was also very helpful and informative to the public and thus was also assessed to be very effective with a mean response of 3.31. Similarly, the study Antonio et al. (2022) on millennial community leaders during the COVID-19 pandemic underscores the role of technology and the characteristics of millennial leaders in responding to crises. Despite their perceived lack of experience and resources, millennial leaders demonstrate responsibility, accountability, and people-centeredness, leveraging their technological inclination to lead effectively during emergencies. Their attributes, such as honesty, reliability, and approachability, align with the qualities needed to effectively utilize social media platforms for disaster response and communication.

3.3.1.2 Effectiveness and Demographic Characteristics of Clienteles

Table 2 Mean Response and Level of Effectiveness of Social Media Platform as a Reporting Tool According to Age Group of Clienteles.

Age	Mean Response	Verbal Interpretation
Under 18 years old	0	N/A
18-24 years old	0	N/A
25-34 years old	3.52	Very Effective
35-44 years old	2.96	Somewhat Effective
45-54 years old	2.70	Somewhat Effective
55-64 years old	3.40	Very Effective
65 and above	0	N/A

The data in Table 2 showed that clienteles whose ages were 35 to 44 years old and 45 to 54 years old claimed that the use of social media platform as a reporting tool was somewhat effective with mean responses of 2.96 and 2.70, respectively. Meanwhile, clienteles of ages 25 to 34 years old and 55 to 64 years old claimed that the use of social media as a reporting tool was very effective with mean responses of 3.52 and 3.40, respectively. However, the difference in the extent of effectiveness seen were not statistically significant was supported by the result of the Kruskal-Wallis H test which showed that there were no significant differences in the effectiveness of using social media platform as a reporting tool as perceived by clients of different age groups ($X^2(3)=3.352, p=0.341$). This is particularly relevant to the research published by Agustin et al. (2023), about businesses needing to adapt to technological changes and the digital economy. The integration of social media as a reporting and feedback tool can be seen as part of the broader digital transformation efforts that businesses are encouraged to undertake to improve customer engagement, operational efficiency, and decision-making processes.

Table 3 Mean Response and Level of Effectiveness of Social Media Platform as a Reporting Tool According to Gender of Clienteles.

Gender	Mean Response	Verbal Interpretation
Male	3.24	Somewhat Effective
Female	3.10	Somewhat Effective
Prefer not to say	3.20	Somewhat Effective

The result of the Kruskal-Wallis H test which showed that there were no significant differences in the effectiveness of using social media platform as a reporting tool when clienteles were grouped by gender ($X^2(2)=0.347, p=0.841$). The data in Table 3 showed that all clienteles, whether male, female, or those who chose not to disclose their gender, claimed that social media was somewhat effective when used a reporting tool with mean responses of 3.24, 3.10, and 3.20, respectively. The research by Talplacido Et al. (2021) discussion on the critical need for a localized and automated early warning system for disaster preparation, specifically for flood risk mitigation in the municipality of San Leonardo, dovetails with the research findings on the effectiveness of social media as a reporting tool, albeit in a different context. The findings indicate that social media platforms are somewhat effective across different genders for reporting purposes, suggesting that digital tools are broadly accepted and utilized across the population. This universal acceptance and utilization underscore the potential for implementing technology-driven solutions, like the proposed automated early flood warning system, within the community. Just as social media can serve as an effective platform for information dissemination and reporting, the automated warning system represents a technological advancement aimed at improving disaster preparedness and response.

Table 4 Mean Response and Level of Effectiveness of Social Media Platform as a Reporting Tool According to Educational Attainment of Clienteles.

Educational Attainment	Mean Response	Verbal Interpretation
High School Graduate	3.10	Somewhat Effective
College Graduate	2.96	Somewhat Effective
Graduate Degree	3.37	Very Effective

The data in Table 4 showed that high school graduate and college graduate clienteles claimed that the use of social media as a reporting tool was somewhat effective with mean responses of 3.10 and 2.96, respectively. Meanwhile, clienteles who earned their graduate degree claimed that the use of social media was very effective with a mean response of 3.37. However, these differences in the extent of effectiveness were not statistically significant as supported by the result of the Kruskal-Wallis H test which showed that there were no significant differences in the effectiveness of using social media platform as a reporting tool when clienteles were grouped according to their educational attainment ($X^2(2)=0.812$, $p=0.666$). Similarly, the research of Casimiro et al. (2020), underscores the awareness and perception of researchers towards publication policies, showing that individuals with higher educational attainment levels are more familiar with research requirements. Both the research findings and the RRL underscore the importance of leveraging research and communication channels, whether through social media or formal publication policies, to disseminate valuable information and enhance organisational transparency and accountability.

Table 5 Mean Response and Level of Effectiveness of Social Media Platform as a Reporting Tool According to Occupation of Clienteles.

Occupation	Mean Response	Verbal Interpretation
Employed	3.12	Somewhat Effective
Unemployed	3.80	Very Effective

The data in Table 5 showed that employed clienteles claimed that the use of social media as a reporting tool was somewhat effective with a mean response of 3.12, while, unemployed clienteles claimed that the use of social media as a reporting tool was very effective with a mean response of 3.80. However, these differences in the extent of effectiveness were not statistically significant as supported by the result of the Kruskal-Wallis H test which showed that there were no significant differences in the effectiveness of using social media platform as a reporting tool when clienteles were grouped according to their occupation ($X^2(1)=0.885$, $p=0.347$).

Table 6 Mean Response and Level of Effectiveness of Social Media Platform as a Reporting Tool According to Location of Clienteles.

Location	Mean Response	Verbal Interpretation
Urban	3.13	Somewhat Effective
Sub-Urban	2.90	Somewhat Effective
Rural	3.47	Very Effective

The data in Table 6 showed that clients who resided in the urban and sub-urban areas claimed that the use of social media as a reporting tool was somewhat effective with mean responses of 3.13 and 2.90, respectively. Meanwhile, clients who reside in the rural areas claimed that the use of social media as a reporting tool was very effective with a mean response of 3.47. However, these differences in the extent of effectiveness were not statistically significant as supported by the result of the Kruskal-Wallis H test which showed that there were no significant differences in the effectiveness of using social media platform as a reporting tool among clienteles living in different locations ($X^2(2)=1.260, p=0.532$).

3.3.2 Effectiveness Perceived by DPWH Region III PIOs

3.3.2.1 Overall Mean Response and the Extent of Effectiveness of Social Media Platform as a Reporting Tool

Table 7 Mean Response and Level of Effectiveness of Social Media Platform as a Reporting Tool Perceived by PIOs.

Statement	Mean Response	Verbal Interpretation
Accurate reporting of disasters and incidents on roads, bridges, and flood control in social media platform by the DPWH, Region III.	3.76	Very Effective
Shared reliable information on social media platform during disaster and/or incident response at roads, bridges and flood control projects of DPWH, Region III.	3.82	Very Effective
Real-time reporting and updating in DPWH, Region III social media.	3.70	Very Effective
Social media is an effective tool for disseminating information quickly to a wide audience.	3.91	Very Effective
Overall	3.80	Very Effective

Table 7 showed the mean response and corresponding level of effectiveness of social media platforms used as reporting tools as perceived by DPWH PIOs. According to the PIOs, the use of social media as a reporting tool for disasters and incidents was very effective with an overall mean response of 3.80. The data in Table 9 showed that social media platforms reflect accurate reports, reliable information, real-time monitoring, and enables quick dissemination of information.

3.3.3 Effectiveness and Demographic Characteristics of PIOs

Table 8 Mean Response and Level of Effectiveness of Social Media Platform as a Reporting Tool According to Age Group of PIOs

Age	Mean Response	Verbal Interpretation
Under 18 years old	0	NA
18-24 years old	3.82	Very Effective
25-34 years old	3.75	Very Effective
35-44 years old	4.00	Very Effective
45-54 years old	3.75	Very Effective
55-64 years old	4.00	Very Effective
65 and above	0	NA

The data in Table 8 showed that regardless of age, DPWH PIOs claimed that the use of social media platforms as reporting tool was very effective. This was supported by the results of the Kruskal-Wallis H Test which showed that there were no significant differences in the perceived level of effectiveness of social media when respondents were grouped according to age ($X^2(4)=5.401, p=0.249$).

Table 9 Mean Response and Level of Effectiveness of Social Media Platform as a Reporting Tool According to Gender of PIOs

Gender	Mean Response	Verbal Interpretation
Male	3.73	Very Effective
Female	3.85	Very Effective
Non-Binary	3.75	Very Effective

The data in Table 9 showed that male, female, and non-binary PIOs all claimed that the use of social media platforms as reporting tool was very effective with mean responses of 3.73, 3.85, and 3.75, respectively. This was supported by the results from the Kruskal-Wallis H Test which showed that there were no significant differences in the level of effectiveness of social media as a reporting tool when respondents were grouped by gender ($X^2(2)=1.788, p=0.409$).

Table 10 Mean Response and Level of Effectiveness of Social Media Platform as a Reporting Tool According to Educational Attainment of PIOs

Educational Attainment	Mean Response	Verbal Interpretation
College Graduate	3.80	Very Effective
Graduate Degree	3.79	Very Effective

The results from the Kruskal-Wallis H Test which showed that there were no significant differences in the level of effectiveness of social media as a reporting tool when respondents were grouped by educational attainment ($X^2(1)=0.033, p=0.856$). The data in Table 10 implied that for both college graduates and graduate degree holders, the use of social media as a reporting tool was very effective with mean responses of 3.80 and 3.79, respectively.

Table 11 Mean Response and Level of Effectiveness of Social Media Platform as a Reporting Tool According to Employment Status of PIOs

Employment Status	Mean Response	Verbal Interpretation
Contract of Service (Job Order)	3.72	Very Effective
Permanent	3.89	Very Effective

The results from the Kruskal-Wallis H Test which showed that there were no significant differences in the level of effectiveness of social media as a reporting tool when respondents were grouped according to employment status ($X^2(1)=2.960$, $p=0.085$). According to the data in Table 11, it was evident that regardless of employment status, PIOs claimed that the use of social media was very effective.

Table 12 Mean Response and Level of Effectiveness of Social Media Platform as a Reporting Tool According to Length of Service of PIOs

Length of Service	Mean Response	Verbal Interpretation
Less than a year to 5 years	3.73	Very Effective
6 to 10 years	3.95	Very Effective
11 to 15 years	3.86	Very Effective
More than 15 years	4.00	Very Effective

The results from the Kruskal-Wallis H Test which showed that there were no significant differences in the level of effectiveness of social media as a reporting tool when respondents were grouped according to length of service ($X^2(3)=4.963$, $p=0.174$). The data in Table 12 showed that all PIOs, regardless of how long they were in the service, claimed that the use of social media as a reporting tool was very effective.

3.4 Challenges in the Use of Social Media as a Reporting Tool

Table 13 Mean Response and Challenges Encountered by DPWH PIOs

Statement	Mean Response	Verbal Interpretation
Misinformation and rumors	2.30	Slightly challenging
Volume of information	3.30	Very Challenging
Data accuracy and verification	3.39	Very Challenging
Connectivity issues	3.15	Challenging
Data privacy and security	3.33	Very Challenging
Language and cultural barriers	3.03	Challenging
Timeliness of updates	3.42	Very Challenging
Accessibility and reachability	3.55	Very Challenging

Monitoring and analyzing relevant information	3.45	Very Challenging
Ensuring accurate geolocation and mapping	3.45	Very Challenging
Managing Public Expectations	3.39	Very Challenging

A four-point Likert Scale questionnaire identified the challenges encountered by DPWH PIOs in using social media platforms as a reporting tool for disaster and incident response in DPWH Region III. Mean responses per item were calculated and interpreted using an index (see Appendix B). Among the identified challenges, DPWH PIOs find volume of information, data accuracy and verification, data privacy and security, timeliness of updates, accessibility and reachability, monitoring relevant information, ensuring accurate geolocation and mapping, managing public expectations to be very challenging. Meanwhile, misinformation and rumors were only slightly challenging; connectivity issues and language or cultural barriers were found to be challenging. The challenges identified in the study of Gabriel et al. (2021), such as limited awareness among personnel involved in plan formulation and insufficient sustainability of implemented plans, resonate with the difficulties faced by DPWH PIOs in effectively utilizing social media for disaster reporting.

4. Conclusions

In conclusion, this study provides valuable insights into the utilization and effectiveness of social media platforms as reporting tools for disaster and incident response within the Department of Public Works and Highways (DPWH), Region III. Through a comprehensive analysis of demographic profiles, reports received, and perceived effectiveness among clienteles and DPWH PIOs, several key findings have emerged. Firstly, both clienteles and DPWH PIOs perceive social media platforms as effective tools for disseminating information, providing updates, and addressing concerns related to disaster and incident response. Despite variations in the perceived effectiveness among different demographic groups, such as age, gender, educational attainment, occupation, and location, these differences were not statistically significant, indicating a generally positive perception across the board. Additionally, the study identifies various challenges encountered in the use of social media platforms, including managing the volume of information, ensuring data accuracy and verification, addressing data privacy and security concerns, maintaining timely updates, and managing public expectations. These challenges highlight the need for targeted strategies and interventions to optimize the use of social media platforms for effective disaster and incident response within DPWH Region III.

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