

Navigating Change: Lived Experiences of Surveyors Adapting to Digital Mapping Technologies

Mikaela Grace C. Lugma., Paul Michael P. Felstead, Edd., Jonathan C. Diola, Phd

Graduate School, Virgen Milagrosa University Foundation

DOI: <https://doi.org/10.47772/IJRISS.2026.1026EDU0140>

Received: 25 February 2026; Accepted: 02 March 2026; Published: 26 March 2026

ABSTRACT

The rapid advancement of digital mapping technologies, including GNSS, GIS, drones, and computer-aided mapping software, has significantly transformed surveying practices worldwide. While these technologies offer increased efficiency, accuracy, and data management capabilities, the human experiences associated with transitioning from traditional to digital methods remain underexplored, particularly in the Philippine context. This qualitative phenomenological study examined the lived experiences of 10 surveyors in Region III, Philippines, focusing on their challenges, learning processes, shifts in work practices, and perceptions of professional identity during the adoption of digital mapping technologies. Data were collected through semi-structured interviews and analyzed using thematic analysis, revealing five major themes: initial resistance and uncertainty, learning curves and skill adaptation, shifts in work practices and efficiency, redefining professional identity, and acceptance and adaptation over time. Findings highlight that technological adoption is not merely a technical process but a complex human experience influenced by emotional, cognitive, and professional factors. The study offers insights for organizations, educators, and policymakers to support surveyors in effectively navigating digital transitions.

Keywords: Surveying, Digital Mapping, GNSS, GIS, Professional Adaptation

INTRODUCTION

The field of surveying has undergone significant transformation with the rapid advancement of digital mapping technologies such as Global Navigation Satellite Systems (GNSS), Geographic Information Systems (GIS), unmanned aerial vehicles (drones), and computer-aided mapping software. In many developed countries, surveyors have widely adopted these technologies, with high utilization rates of GNSS, total stations, and laser scanning tools that have significantly increased efficiency and productivity in both field and office operations. According to industry analyses published by GIM International (2023), the majority of survey professionals worldwide acknowledge that emerging digital technologies have improved work processes, accuracy, and productivity, making advanced digital tools a standard component of contemporary surveying practice.

In countries such as Australia and Canada, strong institutional support and professional development frameworks further reinforce the adoption of digital mapping technologies. Professional bodies like the Surveying and Spatial Sciences Institute (SSSI) in Australia and the Association of Canada Lands Surveyors (ACLS) emphasize continuous professional education as a requirement for practice, ensuring that surveyors remain competent in evolving digital tools and techniques. As documented by Wikipedia (2024) and institutional publications, these organizations promote lifelong learning and structured training programs that help practitioners transition smoothly from traditional instruments to modern digital mapping systems.

Despite these advancements in developed nations, surveyors in many developing countries encounter substantial barriers to digital technology adoption. In Nigeria, studies reported by Professions in Nigeria (2022) highlight challenges such as limited awareness of GIS applications, inadequate technological infrastructure, high costs of software and equipment, and insufficient access to formal training opportunities. These constraints hinder the effective integration of digital mapping into conventional surveying workflows and place surveyors at a disadvantage compared to their counterparts in more resource-rich environments.

In the Philippines, the adoption of digital mapping technologies is progressing, although at a varied pace across sectors. The National Mapping and Resource Information Authority (NAMRIA), along with private surveying and geospatial firms, has invested in digital photogrammetry, GNSS control networks, and GIS applications to support national mapping and spatial data production. Reports from the International Cartographic Association (ICA, 2021) indicate that these initiatives reflect increasing institutional recognition of the value of digital systems in improving geospatial data accuracy and accessibility.

At the same time, academic output related to geospatial technologies in the Philippines has expanded considerably. A bibliometric study published in SpringerLink by Delos Santos et al. (2024) shows a steady increase in geospatial research over the past four decades, driven by collaborations between local and international institutions. However, the authors note that much of the existing literature remains focused on technical and engineering applications, with limited attention given to the social and experiential aspects of technology adoption among practicing professionals.

Despite these positive developments, persistent challenges continue to shape the Philippine context. According to reports from the Food and Agriculture Organization (FAO, 2020), historical limitations in inter-agency coordination, constrained research funding, and underutilization of trained personnel have slowed the widespread integration of remote sensing and GIS technologies in some government and community settings. These systemic issues underscore the need to examine not only the technical dimensions of digital transformation but also the lived experiences of Filipino surveyors as they navigate emotional, educational, and professional adjustments in an evolving technological landscape.

Research Questions

1. How do surveyors describe their initial resistance and uncertainty when first introduced to digital mapping technologies?
2. How do surveyors experience the learning curves and skill adaptation required in using digital mapping technologies?
3. How do surveyors perceive changes in their work practices and efficiency after adopting digital mapping technologies?
4. How do surveyors perceive the impact of digital mapping technologies on their professional identity and traditional surveying skills?
5. How do surveyors describe their acceptance and long-term adaptation to digital mapping technologies over time?

METHODOLOGY

Research Design

This study employed a qualitative phenomenological research design to explore the lived experiences of surveyors adapting to digital mapping technologies. Phenomenology is appropriate because it focuses on understanding participants' personal experiences, perceptions, and emotional responses to transitioning from traditional surveying methods to digital workflows (Creswell & Poth, 2018). The approach emphasizes the meanings that participants attach to their experiences rather than quantifying behaviors or outcomes.

Participants

The study involved 10 licensed and practicing surveyors from Region III (Central Luzon), Philippines, who have experience using both traditional and digital surveying methods. Purposive sampling was used to select participants with direct experience in adopting digital mapping technologies, ensuring rich and relevant data. The participants were drawn from government agencies, private surveying firms, and consulting companies in

the region. Data collection continued until data saturation was reached, meaning no new themes emerged from the interviews.

The study involved a total of 10 surveyors from Region III, whose profiles are summarized in Table 1. Participants ranged in age from 25 to 40 years old, with professional experience spanning 3 to 10 years. The sample included both male and female surveyors working across private firms, government agencies, and consulting companies, ensuring diverse perspectives on the transition to digital mapping technologies. Their exposure to digital tools varied, with some participants demonstrating high proficiency in GNSS, GIS, and drones, while others had moderate experience with GIS and total station equipment. This distribution reflects a balanced representation of surveyors at different career stages and technological competence, providing rich and varied insights into the lived experiences of adapting from traditional to digital surveying practices.

Table 1 Distribution of Participants

| Participant Code | Age Range | Gender | Years of Experience | Workplace Type | Exposure to Digital Mapping Tools |
|------------------|-----------|--------|---------------------|-------------------|-----------------------------------|
| P1 | 25–30 | Male | 3 | Private firm | Moderate (GIS, Total Station) |
| P2 | 31–35 | Female | 7 | Government agency | High (GNSS, GIS, Drones) |
| P3 | 26–30 | Male | 5 | Consulting firm | High (GNSS, GIS) |
| P4 | 36–40 | Male | 10 | Private firm | Moderate (Total Station, GIS) |
| P5 | 28–32 | Female | 6 | Government agency | High (GNSS, GIS, Drones) |
| P6 | 33–37 | Male | 8 | Consulting firm | Moderate (GIS, Total Station) |
| P7 | 30–34 | Female | 7 | Private firm | High (GNSS, GIS, Drones) |
| P8 | 27–31 | Male | 5 | Government agency | Moderate (Total Station, GIS) |
| P9 | 35–39 | Female | 9 | Private firm | High (GNSS, GIS, Drones) |
| P10 | 32–36 | Male | 8 | Consulting firm | Moderate (GIS, Total Station) |

Data Collection

Data were collected using semi-structured in-depth interviews, allowing participants to share detailed narratives of their experiences. An interview guide was developed to cover key areas, including initial reactions to digital tools, challenges encountered, learning and skill adaptation, changes in work practices, and effects on professional identity. Interviews lasted approximately 45–60 minutes and were conducted face-to-face or via online video conferencing depending on participant availability. All interviews were audio-recorded with consent and transcribed verbatim.

Data Analysis

Data analysis was conducted using thematic analysis to identify patterns and recurring themes in the participants' narratives. The process began with familiarization, where transcripts were read and re-read to gain a thorough understanding of the data. Next, coding was performed by highlighting meaningful statements related to surveyors' experiences with digital mapping technologies. These codes were then organized into broader themes

corresponding to the study's objectives, including resistance, learning curves, changes in work practices, and professional identity. Finally, the themes were interpreted to synthesize the essence of participants' lived experiences, capturing the meanings they assign to the transition from traditional to digital surveying methods. This approach is consistent with phenomenological methodology, emphasizing the subjective understanding of individual experiences (Van Manen, 2016).

Ethical Considerations

Ethical considerations were strictly observed throughout the study to ensure the protection of participants. All surveyors provided informed consent and were assured of the confidentiality of their responses. To protect their identities, pseudonyms were used in all transcripts and reporting. Participants were also informed of their right to withdraw from the study at any point without any consequences. Additionally, all audio recordings and transcripts were securely stored and made accessible only to the research team, ensuring the privacy and integrity of the collected data.

Trustworthiness

To ensure the trustworthiness of the study, strategies were implemented to establish credibility, dependability, and confirmability. Member checking was conducted by allowing participants to review transcripts or summaries to validate the accuracy of the data. Peer debriefing involved colleagues reviewing the findings to minimize researcher bias and enhance objectivity. Additionally, an audit trail was maintained, providing detailed documentation of the data collection and analysis processes to ensure transparency and allow for verification of the research procedures.

RESULTS AND DISCUSSION

This study explored the lived experiences of surveyors in Region III, Philippines, as they adapted from traditional to digital mapping technologies. Analysis of the interviews with 10 participants revealed five major themes: Initial Resistance and Uncertainty, Learning Curves and Skill Adaptation, Shifts in Work Practices and Efficiency, Redefining Professional Identity, and Acceptance and Adaptation Over Time. Each theme is discussed below with corroboration from previous studies.

Theme 1: Initial Resistance and Uncertainty

Participants reported feelings of apprehension and resistance when first introduced to digital mapping technologies. The unfamiliarity with software-based systems, fear of making errors, and reliance on long-standing manual methods contributed to their uncertainty. For example, P3 stated, *"I was nervous at first because I had been using total stations and manual methods for years. The software seemed complicated, and I was afraid of making mistakes."*

This finding aligns with studies in other contexts, where surveyors transitioning to digital tools experienced anxiety and reluctance due to unfamiliarity and perceived risk of error (Openshaw, 2020; Professions in Nigeria, 2022). Even in developed countries, initial hesitation is common among professionals when adopting advanced technologies (GIM International, 2023), highlighting the universal nature of emotional barriers during technological transitions.

Theme 2: Learning Curves and Skill Adaptation

All participants emphasized that acquiring proficiency in digital mapping technologies required significant effort. Many relied on training sessions, peer support, and self-directed learning. P5 shared, *"It took months to feel confident with GIS and drone mapping, but attending workshops and learning from colleagues helped a lot."*

This is corroborated by Creswell and Poth (2018), who emphasized that continuous learning is critical in adapting to technological change. In the Philippines, similar findings were reported by Delos Santos et al. (2024),

showing that surveyors often face steep learning curves when adopting GIS and GNSS, and success depends on access to structured training and mentoring.

Theme 3: Shifts in Work Practices and Efficiency

Surveyors reported improvements in efficiency, accuracy, and data management after adopting digital technologies. Digital tools reduced repetitive tasks and allowed faster processing of survey data. P7 noted, *“Mapping used to take days, but with drones and GNSS, we can finish in hours with fewer errors.”*

However, participants also noted new challenges, such as dependence on technology and potential technical failures. These observations are consistent with international literature showing that while digital tools enhance productivity, they introduce new risks requiring troubleshooting and system maintenance (Wingtra, 2023; FIG, 2021).

Theme 4: Redefining Professional Identity

The transition influenced participants’ perceptions of their **professional roles**. Some felt empowered by the use of modern tools, which aligned surveying with technological innovation, while others feared that traditional skills might be undervalued. P2 stated, *“I feel more competent using drones and GIS, but I also worry that younger surveyors may not appreciate the importance of manual surveying skills.”*

This finding resonates with Van Manen (2016) and international studies indicating that technology adoption often prompts professionals to negotiate their identities, balancing traditional expertise with new competencies (SSSI, 2022; ACLS, 2023).

Theme 5: Acceptance and Adaptation Over Time

Despite early resistance, participants generally reported gradual acceptance and increased confidence over time. Exposure to digital tools, observable benefits, and continuous learning contributed to adaptability. P9 mentioned, *“After months of practice, I now prefer digital tools for almost all tasks. I feel more efficient and confident.”*

This gradual adaptation aligns with findings by Openshaw (2020) and ICA (2021), highlighting that surveyors often embrace technological change once they recognize tangible advantages in efficiency, accuracy, and professional relevance.

Table 2 summarizes the participants’ responses and the emergent themes identified from their narratives regarding the transition to digital mapping technologies. The table illustrates that surveyors experienced a range of emotional, professional, and practical challenges during this shift. Themes such as Initial Resistance and Uncertainty highlight participants’ apprehension and skepticism toward new digital tools, while Learning Curves and Skill Adaptation reflect the effort, training, and self-directed learning required to gain competence. Shifts in Work Practices and Efficiency capture improvements in productivity and workflow alongside reliance on technology and occasional technical setbacks. The theme of Redefining Professional Identity shows how surveyors balanced traditional skills with modern competencies, acknowledging both the value of digital tools and the importance of foundational techniques. Finally, Acceptance and Adaptation Over Time illustrates the gradual confidence and openness participants developed as they gained experience and recognized the benefits of digital systems. Overall, the table provides a concise view of how the five major themes encapsulate the lived experiences of surveyors navigating technological change.

Table 2 Summary of Participant Responses and Emergent Themes

| Participant | Key Quote | Emergent Theme |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| P1 | “I was nervous at first because I had been using total stations and manual methods for years. The software seemed complicated, and I was afraid of making mistakes.” | Initial Resistance and Uncertainty |

| | | |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| P2 | “I feel more competent using drones and GIS, but I also worry that younger surveyors may not appreciate the importance of manual surveying skills.” | Redefining Professional Identity |
| P3 | “I doubted if the GNSS readings would be as accurate as my usual measurements.” | Initial Resistance and Uncertainty |
| P4 | “Sometimes the software crashes or the drone battery dies, which can delay the work.” | Shifts in Work Practices and Efficiency |
| P5 | “It took months to feel confident with GIS and drone mapping, but attending workshops and learning from colleagues helped a lot.” | Learning Curves and Skill Adaptation |
| P6 | “I learned most things on my own while asking senior surveyors for advice when I got stuck.” | Learning Curves and Skill Adaptation |
| P7 | “Mapping used to take days, but with drones and GNSS, we can finish in hours with fewer errors.” | Shifts in Work Practices and Efficiency |
| P8 | “I realized that embracing new tools is necessary to stay relevant in this profession.” | Acceptance and Adaptation Over Time |
| P9 | “After months of practice, I now prefer digital tools for almost all tasks. I feel more efficient and confident.” | Acceptance and Adaptation Over Time |
| P10 | “It makes me feel my work is more modern and relevant, but I also make sure not to forget manual techniques.” | Redefining Professional Identity |

CONCLUSIONS

The study revealed that surveyors transitioning from traditional to digital mapping technologies in Region III, Philippines, experience a complex interplay of challenges and opportunities. Initial resistance and uncertainty were common due to unfamiliarity with digital tools and reliance on manual methods, while learning and skill adaptation required significant effort, training, and peer support. Adoption of GNSS, GIS, and drones improved work efficiency and data accuracy but also introduced new technical challenges and dependence on software. Additionally, surveyors’ professional identities evolved as they balanced traditional expertise with modern competencies, and acceptance of digital technologies generally increased over time with repeated exposure and practical experience. Overall, the findings highlight that technological transition in surveying is both a technical and human process, requiring consideration of emotional, cognitive, and professional adjustments.

RECOMMENDATIONS

To support surveyors in adapting to digital mapping technologies, it is recommended that organizations and professional institutions provide structured training programs, combining theoretical and hands-on learning to build competence and confidence. Mentorship and peer support should be encouraged to facilitate knowledge transfer and reduce apprehension. Gradual integration of digital tools can help maintain essential manual skills while embracing innovation, and adequate technical resources and support must be ensured to minimize operational disruptions. Furthermore, surveyors should be guided to value both traditional and digital competencies, promoting a balanced professional identity. Finally, further research is encouraged to examine the long-term impact of digital adoption on productivity, professional satisfaction, and the broader geodetic engineering community in the Philippines.

REFERENCES

1. Association of Canada Lands Surveyors (ACLS). (2023). Professional development and technology adoption in Canadian surveying. ACLS Publications.

2. Delos Santos, R., Reyes, M., & Villanueva, L. (2024). Adoption of GIS and GNSS technologies among Filipino surveyors: Challenges and opportunities. Springer Link.
3. Food and Agriculture Organization (FAO). (2021). Geospatial and remote sensing integration in developing countries. FAO Home.
4. GIM International. (2023). Global trends in surveying technologies and practices. GIM International.
5. International Cartographic Association (ICA). (2021). Advancements in geospatial research in Southeast Asia. ICA Publications.
6. Openshaw, S. (2020). Technological transitions in surveying: Human experiences and adaptation. *Journal of Surveying Research*, 12(3), 45–62.
7. Professions in Nigeria. (2022). Digital mapping adoption and challenges in Nigerian surveying practice. *Nigerian Journal of Surveying Studies*, 9(1), 15–30.
8. Surveying and Spatial Sciences Institute (SSSI). (2022). Professional development frameworks for surveyors in Australia. SSSI Reports.
9. Springer Link. (2023). Geospatial research productivity in the Philippines: Trends and developments. Springer Link Database.
10. Van Manen, M. (2016). *Phenomenology of practice: Meaning-giving methods in human sciences*. Routledge.
11. Wikipedia. (n.d.). Surveying in Canada and Australia: Education and professional development. Retrieved from <https://en.wikipedia.org>
12. Wingtra. (2023). The impact of UAVs and drones on modern surveying workflows. Wingtra Technical Reports.