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Building trust towards drone identification system

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Abstract Drones or UAV (Unmanned Aircraft Vehicles) are increasingly used across sectors such as emergency response, infrastructure inspection, logistics, and creative industries. Despite their growing applications, public acceptance remains inconsistent, particularly when drones are encountered unexpectedly in everyday environments. While drones used for socially beneficial purposes (such as search and rescue mission, medical delivery, and firefighting) are often perceived positively, leisure or commercial uses tend to raise concerns regarding privacy, safety, and potential misuse. This highlights the need to improve transparency, accountability and public trust.

This study considers public perceptions towards the idea of drone identification system, designed to provide real-time information about nearby drone operations, including operator identity and flight purpose. This was explored through focus groups using workshop-style sessions with members of the public. Participants engaged in role-play scenarios involving different drone use contexts, including hobbyist, commercial application such as delivery and inspection, emergency services, and governance perspectives, incorporating the viewpoints of regulators, policymakers, legal professionals, and governmental authorities involved in the oversight of drone operations, while interacting with draft concepts of identification system.

Preliminary findings suggest that transparency significantly influences public acceptance, particularly in sub-urban and residential settings. Participants expressed a desire to know who is operating a drone, and non-technical information regarding drone operational scope was considered essential. The findings indicate that drone identification systems could enhance trust and societal acceptance by increasing operational transparency and distinguishing legitimate drone use from potentially intrusive or unsafe activities.

Keywords: Drone; UAVs; Identification system; Trust; Public perception; Public acceptance; Regulation

1. INTRODUCTION

Drones or UAV (Unmanned Aircraft Vehicles) operate in various sectors and offer significant benefits for human activities, including emergency response, infrastructure inspection, logistics, agriculture, and creative industries. However, despite these advantages, there are some factors that can influence public acceptance of drones, such as noise, privacy and security concerns including perceived usefulness, trust and social context (Wang et al., 2023; Clothier et al., 2015; Khan et al., 2018; Sabino et al., 2022; Luppigini and So, 2016; Tan et al., 2020; Aydin, 2019; Smith et al., 2022). Understanding public attitudes towards the deployment of drone technology in society requires a multidimensional approach drawing on diverse disciplines. This study aims to develop an approach to harmonize the public acceptance and application of drone in real life.

Investigating how trust in drone technology can be established to support and enhance societal acceptance of this emerging technology is inherently multifaceted. Some recent studies demonstrate that drone use for societal benefits tend to gain more support than drone used for individual purposes (Aydin, 2019; Eißfeldt et al., 2020; Stolz et al., 2023; Sabino et al., 2022; Tan et al., 2020; Boucher, 2015; Tepylo et al., 2023). Additionally, enhancing public acceptance of drone ecosystems and the concept of Advanced Air Mobility (AAM) requires not only technological advancement and regulatory support, but also trust-centered frameworks that account for public perception, governance, and societal legitimacy (Chaisit et al, 2024). However, while conceptual frameworks highlight the importance of trust and transparency, limited empirical research has explored how these principles could be translated into practical mechanisms that members of the public can directly interact with in everyday life.

The contextual usage of drones can shape the public perception which is highly relevant to the development of trust as a connecting key factor in supporting the integration of drone operation and shaping public acceptance (Wang, 2025). There is some evidence (noted above) that people are more likely support drone's usage for societal benefits rather than commercial and leisure activities – but how do we identify the flying drones when we notice them. A key unresolved question remains: when members of the public notice a drone flying nearby, how can they identify who is operating it, for what purpose, and whether the operation is legitimate? Although drone identification and tracking technologies are increasingly being discussed within regulatory and technical domains, little is known about how the public perceives such systems, what information they would expect to access, and whether these tools could meaningfully enhance trust and societal acceptance.

To address this gap, this focus group study explores public perceptions, expectations, and concerns regarding the concept of a public-facing drone identification system as a potential mechanism to improve transparency and trust in drone operations. Specifically, the study investigates what information members of the public would expect to access when encountering drones in real-world environments, how such information may influence perceptions of legitimacy, safety, and accountability, and whether such a system could enhance societal acceptance of drone technology. A qualitative focus group approach was adopted to capture nuanced public perspectives, emotional reactions, and practical expectations through interactive discussion and scenario-based exploration. The findings aim to inform the user-centred design of future drone identification systems and contribute to broader discussions on responsible drone integration and public trust.

2. METHODOLOGY

This study conducted focus group workshop sessions to explore how individuals perceive the concept of a drone identification or tracking system, particularly if such a system were made publicly accessible. The main research question guiding this study is: “Can a drone identification system enhance the public acceptance of drone operations in wider society?”.

To address this question, the focus group workshop was designed to examine participants’ attitudes and thought processes regarding drone usage in real-life scenarios, based on the premise that drones are widely integrated into everyday society. This study adopted a mixed-methods approach, incorporating both quantitative and qualitative methodologies. The research included some questions aimed at assessing the level of public support for drone operations in society as well as gathering detailed insights into perceptions of the drone identification system, which require in-depth qualitative analysis. The quantitative component focused on measuring the level of public support for drone operations in wider society, enabling the study to identify general trends, attitudes, and patterns across participants. In addition, the qualitative component aimed to explore participants’ deeper perceptions, concerns, expectations, and experiences regarding the concept of a drone identification system, particularly in relation to trust, transparency, safety, privacy, and societal acceptance.

2.1 Research design

The workshop session was designed to encourage participants to reflect on encounters with flying drones in different situations in real life scenarios. The workshop comprised three main activities: the first one explored participant’s general perception of drone use, the second constituted the central component of this study through scenario-based role play, and the final session examined the information requirements for a public-facing drone identification system. To deepen reflection and encourage perspective-taking, the study applied a persona-based approach (Palmer et al., 2025).

First, all personas (See Figure 1) were created to portray different drone operators and general public, referring to study of the relevant stakeholders framework by Upadrasta et al. (2022) to simulate the scenarios and shape the participants to see the same picture when conducting the session. Afterwards, to illustrate all participants to be in the same situation, the scenario as shown in figure 2 was presented to depict the simulation of drone operation in different context within same scene.

These personas (figure 1) were designed to represent key stakeholder roles within the drone ecosystem, reflecting a range of perspectives, responsibilities, and potential concerns associated with drone operations. Each persona embodies a distinct social position such as a local resident, drone hobbyist, commercial operator, policymaker, or emergency service representative, allowing participants to engage with the discussion from viewpoints beyond their own lived experiences. By presenting structured persona profiles (including background, motivations, concerns, and expectations), the workshop encouraged participants to consider how different actors might perceive drone identification systems in terms of trust, transparency, safety, accountability, and societal benefit.

The use of personas served two primary purposes. First, it facilitated perspective-taking by prompting participants to “step into the shoes” of other stakeholders within the drone ecosystem. Second, it supported richer and more balanced discussions by reducing the likelihood that conversations would be dominated solely by personal opinion. Instead, participants were encouraged to think systemically about how drone identification systems might function across different user groups and social contexts which all portrayed within

the same simulated location presented during the session (figure 2).

These persona-based figures therefore acted as practical tools for eliciting deeper reflections on governance, legitimacy, and the social conditions necessary for wider public acceptance of drone operations.

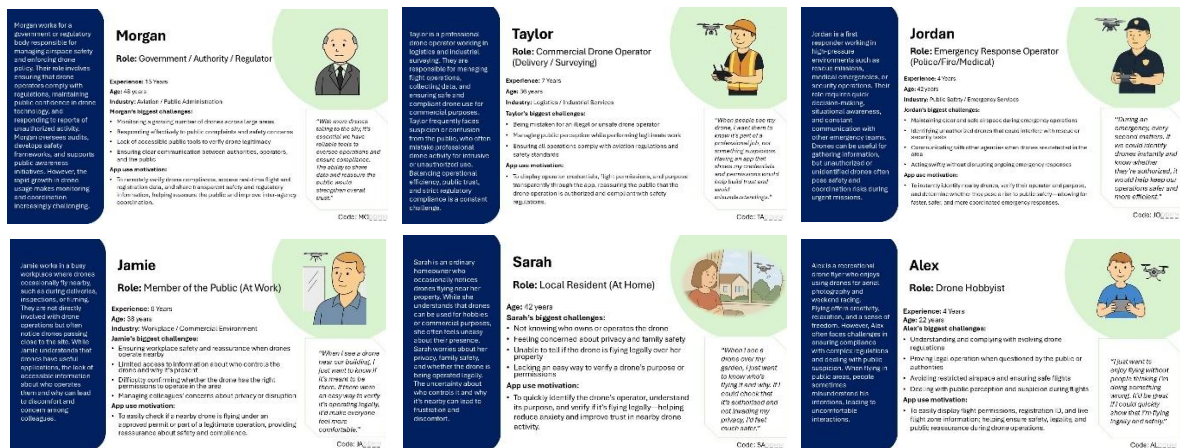


Figure 1: Persona cards

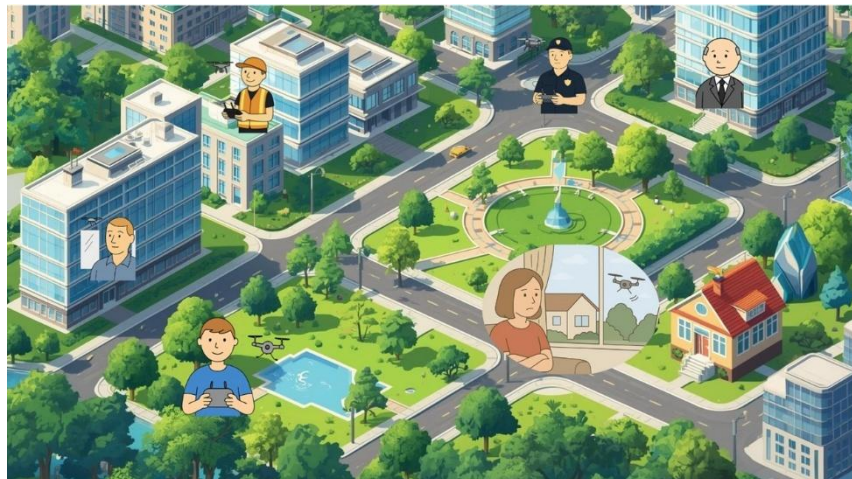


Figure 2: the scenario of drone operation

Participants were encouraged to imagine a near-future scenario where drones are integrated into everyday life, such as for delivery services, medical transport, infrastructure inspection, leisure activities and emergency response, resulting in frequent visible drone activity overhead. By situating the discussion within this simulated future context, the study aimed to move beyond current perceptions and explore anticipated reactions, expectations, and conditions for acceptance in a more mature drone-operating environment.

Participants were asked to adopt stakeholder personas that represent individuals involved in or affected by drone operations (e.g., a local resident, a commercial drone operator, a policymaker, or an emergency responder). The persona-based exercise was particularly valuable for eliciting discussions about trust, accountability, transparency, and regulatory expectations, as participants were encouraged to think systemically about how different actors interact within the drone operation ecosystem.

By combining stakeholder grouping, digital twin-based simulated scenario, and persona-based engagement, the workshop design aimed to generate rich, multi-perspective insights into how drone identification systems might be perceived, evaluated, and shaped through participatory dialogue. This approach aligns with the broader research objective of

enhancing societal acceptance through inclusive and forward-looking design processes.

2.2 Analytical Approach

The use of a mixed-methods approach in this study allowed the research to capture not only measurable levels of support but also the underlying reasoning and meanings behind participants' responses which this method is also widely used in social research (Bryman, 2006). This approach is particularly suitable for exploring emerging technologies such as drones, where public attitudes are often shaped by complex social, ethical, and regulatory considerations.

For the qualitative analysis, this study was mainly informed by the thematic analysis approach developed by Virginia Braun and Victoria Clarke (2022), which emphasises a flexible yet rigorous process for identifying, analysing, and interpreting patterns of meaning within qualitative data. Following Braun and Clarke's reflexive thematic analysis approach, the data were systematically coded to identify recurring themes and shared perspectives related to drone identification systems and public acceptance. This analytical approach enabled the researcher to move beyond simple description and develop a richer interpretation of participants' viewpoints within the broader social and regulatory context of drone integration into society. Moreover, some parts of the data were analysed using content and sentiment analysis to enable a more detailed exploration of participant's expressed viewed and emotional responses.

3. RESULTS AND DISCUSSIONS

A total of 24 participants took part in the workshop sessions with six focus groups conducted involving varying numbers of participants. Participants engaged in discussions and scenario-based role-play activities which were designed to capture their attitudes, concerns, and expectations regarding drone use and public-facing identification systems. The collected qualitative data were analyzed applying thematic analysis, supported by content and sentiment analysis, to provide a comprehensive understanding of participants' perceptions, emotional responses, and information requirements. The findings are organized around the key themes that emerged from the analysis.

The first part of session explored the general perception of drone use from participants. According to figure 3 revealed the participants' initial thoughts of drone that the most dominant association was "surveillance," followed by terms such as "video," "privacy," "noisy," "military," and "weapons." Positive associations, including "transport," "rescue," "potential," and "technology," also emerged, although less prominently. This suggests that public perceptions of drones are strongly shaped by concerns related to surveillance, privacy, and disturbance, while recognizing potential societal benefits. The findings highlight the dual nature of public attitudes towards drone technology, combining both perceived opportunities and concerns.



Figure 3: Word cloud of participants’ first thoughts when thinking about drones

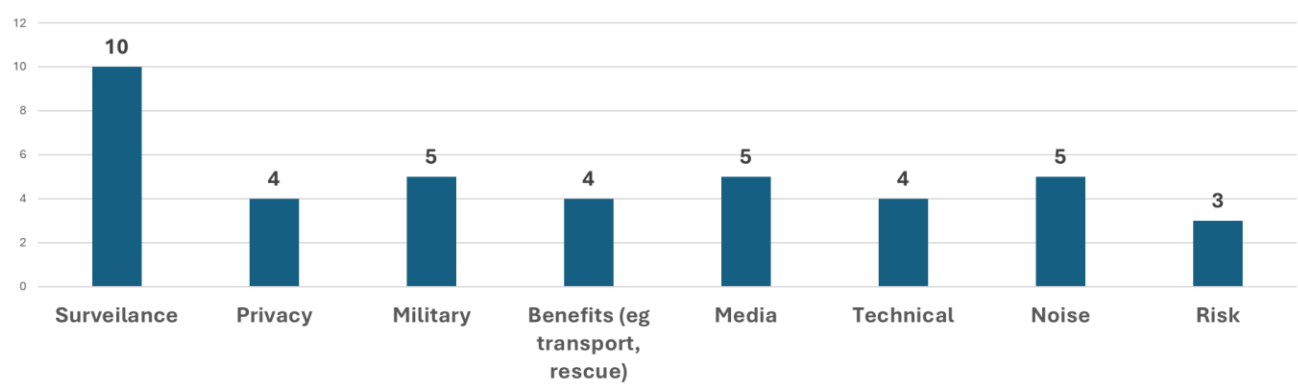


Figure 4: Frequency of participants’ initial associations with drones

Figure 4 presents the frequency of identified theme that emerged from the participants’ first thought of drone, surveillance was the most frequently mentioned theme (41.67%), followed by military associations, media and noise concern (20.83%).

Privacy, technical aspects, and perceived societal benefits, such as transport and rescue, were also mentioned, while risk was less frequently identified. These findings suggest that public perceptions of drones are shaped not only by their potential societal benefits but also by concerns relating to surveillance, privacy, and nuisance, highlighting the complex and often ambivalent nature of public attitudes towards drone technology.

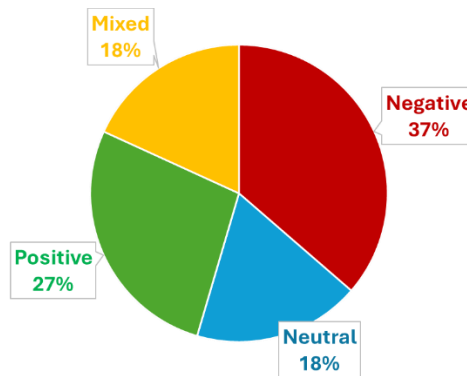


Figure 5: Participants' emotional responses when encountering flying drones

Apart from the initial thought of drones, all participants were also asked about the emotion and experience of encountering drone in real life. Figure 5 illustrates that negative responses were the largest proportion (37%), suggesting that encounters with drones are often associated with annoyance, discomfort, or concern about privacy. Further examples of participants' expressed views are presented in the quotations shown in Table 1 below. Positive responses accounted for 27%, indicating that some participants viewed drones favorably, potentially recognizing their technological or societal benefits. Neutral (18%) and mixed responses (18%) suggest that public attitudes are not uniformly polarized, with some individuals expressing uncertainty or simultaneously acknowledging both positive and negative aspects of drone operations. These findings highlight the complexity of public emotional responses towards drone presence in everyday environments.

Table 1: Participants' Emotional Reactions to Encountering Drones in Daily Life

Negative	Positive	Neutral	Mixed
• "Annoying" • "invade privacy" • "quite loud, can be annoying, don't know who operating this" • "felt like on invasion of privacy at home" • "felt a tiny bit uneasy and if my privacy was being invaded" • "it made me felt uneasy/concerned" • "it felt extremely life-threatening, intrusive and a complete invasion of privacy which makes me hate to see them"	• "loved it, did a recording with it. The camera on it tracked me while running" • "It looked cool and I wanted one" • "I've seen someone else use it for creative reasons which was nice" • "during a light show. It was very different to anything I'd seen before and exciting." • "Positive at sport events although it's not always official through race and hard to get footage sometimes" • "I thought it was cool. I've seen people using them recreationally. Again, not concerned."	• "it's ok, never feel bad with it" • "intrigued / not too bothered" • "I wondered what they were looking for/ what" • "Get noticed by high level of sounds. Just noticed and ignored"	• "interested / scared" • "I don't mind them as long as they aren't affecting my daily life. But I really don't like when they fly up in the sky & hover for ages, especially over private property like gardens, it's creepy." • "weird but further feeling" • "from my POV it has become a norm for me, but from others I think it's quite strange to them and they feel sceptical about a device flying and hovering around. Overall, the acceptance is not fully acknowledge."

The second and final part of the focus group workshop session formed the core component of this study, focusing on exploring public perception of the concept of using drone identification system, the information requirement expectation by users and potential features needed to enable its effective functioning. Through thematic analysis, seven main themes were identified with each associated subtopic as presented in table 2.

Table 2: Summary of Themes and Associated Topics Identified from Focus Group Discussions on Drone Identification Systems

Theme	Associated Topics	Example	
		Illustrative Participant quotes	Suggested system Features
Transparency and General Information Seeking	- Identity, Accountability and Responsibility - Purpose and Intent Transparency - Location, Tracking and Airspace Awareness - Time and Operational Scope - Operational Benefits	"see who is the owner... and purpose" "figure out who is controlling the drone & why" "what kind of information is it recording" "see who else is flying" "look at nearby drones/operators" "Drone's operator... is it registered?" "show drone owner name" "who is flying it / who authorized it" "what is it being used for" "category e.g. rescue, photography" "why is the drone in the air?" "map that shows drones nearby" "drone path history" "where is it going / where did it come from" "how long it'll be here" "how many times has it flew past" "data on drones within certain areas over time" "accountability" "contact the owner" "crime committed by concealing ID" "I will feel safer when knowing the purpose of the drone" "keep airspace free for emergency"	"verification of drone identity" "verified profile" "company/flyer authentication" "complete visibility of drone data" "display if drone has authorization" "map that shows real-time activities" "display of drone flying route" "simple and concise language" "easy to navigate" "not too technical" "colour coding (police drones blue)" "trustworthy colour scheme" "knowing there was accountability" "easier to track misuse"
Safety, Security and Risk Assessment	- Drone Capability & Risk Awareness - Misuse Prevention & Deterrence - System Credibility & Reliability	"Lets me know whether to be worried or not" "determine whether they pose a risk" "what kind of drone is it (armed or dangerous)" "can it interfere with communications?" "know if there are any dangers" "which drones are which in emergencies" "prevent misuse" "identify suspicious activities"	"no home addresses" "anonymity where appropriate" "evidence / it works" "repeatable results"
Legal Compliance	- Legitimacy & Regulation Verification - Legality & Regulatory Compliance	"check this drone is actually legal" "look up authorized drones" "identify no-fly zones" "whether they have permission" "flight regulations – restricted airspaces" "what can I / can't I do legally" "prove legal compliance" "check legality of operations"	"APP developed by CAA" "interface is backed by gov/regulatory bodies" "accreditation from a regulatory body"
Privacy Protection	- Surveillance & Privacy Concerns - Data & Privacy Transparency	"make sure they are not trying to spy" "filming confidential info in office" "what data is being collected" "who will the data be shared with" "how long the data will be stored" "invade my privacy" "worried about being filmed" "track routines, habits"	"would privacy still be an issue?" "people could use it to troll operators"

Theme	Associated Topics	Example	
		Illustrative Participant quotes	Suggested system Features
Reporting and communication	• Reporting & Control Actions • Interaction & Communication Features	<i>"report drone to authorities"</i> <i>"contact them and ask them to stop"</i> <i>"quick way of contacting other drone operators"</i> <i>"who people can raise concerns with"</i> <i>"can I report an unregistered drone?"</i> <i>"alerts if unauthorized drones"</i>	<i>"alerting why the drone is here"</i> <i>"notification"</i> <i>"post it to the police"</i> <i>"neighborhood watch"</i> <i>"people share reports"</i>
Operator Perspective	• Approved evidence to fly drones / authorization	<i>"reassure the public that I am allowed"</i> <i>"being challenged by the public is difficult"</i>	<i>"my job would be easier"</i>
Trust and Social Acceptance	• Public Empowerment & Rights • Reduced Anxiety & Confidence Building • Increased Safety & Security	<i>"help people trust them more"</i> <i>"shift to a positive light"</i> <i>"people should have right to know"</i> <i>"public need to be informed"</i>	<i>"more trust in drones"</i> <i>"more confident"</i> <i>"at ease"</i> <i>"less worried"</i> <i>"more comfortable"</i> <i>"safer"</i> <i>"feel more secure"</i> <i>"better safety measure"</i>

These themes capture participants' expectations, concerns, and perceived benefits associated with public access to drone identification information. Transparency and general information seeking emerged as the most prominent theme, indicating a strong public desire for accessible information regarding drone ownership, purpose, location, and operational legitimacy. Participants frequently expressed a need to understand who is operating a drone, why it is being used, and whether it is authorised, reflecting broader concerns around accountability and situational awareness.

Other key themes included safety and risk assessment, legal compliance, privacy protection, reporting and communication, operator perspectives, and trust and social acceptance. Collectively, these findings suggest that participants viewed drone identification systems not just as a technical tracking tool, but as a broader mechanism for improving transparency, supporting public reassurance, enabling regulatory accountability, and fostering greater societal trust in drone operations. The illustrative quotations and suggested system feature further demonstrate how participants translated their concerns and expectations into practical design requirements for a public-facing drone identification platform.

Ultimately, there was a positive shift in public support for drone operations when a public drone identification application was introduced. Figure 6 illustrates this pattern through the frequency distribution of responses, showing a clear movement away from lower support scores and towards higher ratings with the mean support score increased from 5.48 to 6.62, indicating a noticeable improvement in acceptance. While general perceptions of drone operations were centered around moderate acceptance, the introduction of a public identification mechanism appears to strengthen confidence and support. This finding aligns with the broader argument that transparency-enhancing tools may contribute to improving societal trust and acceptance of drone technologies.

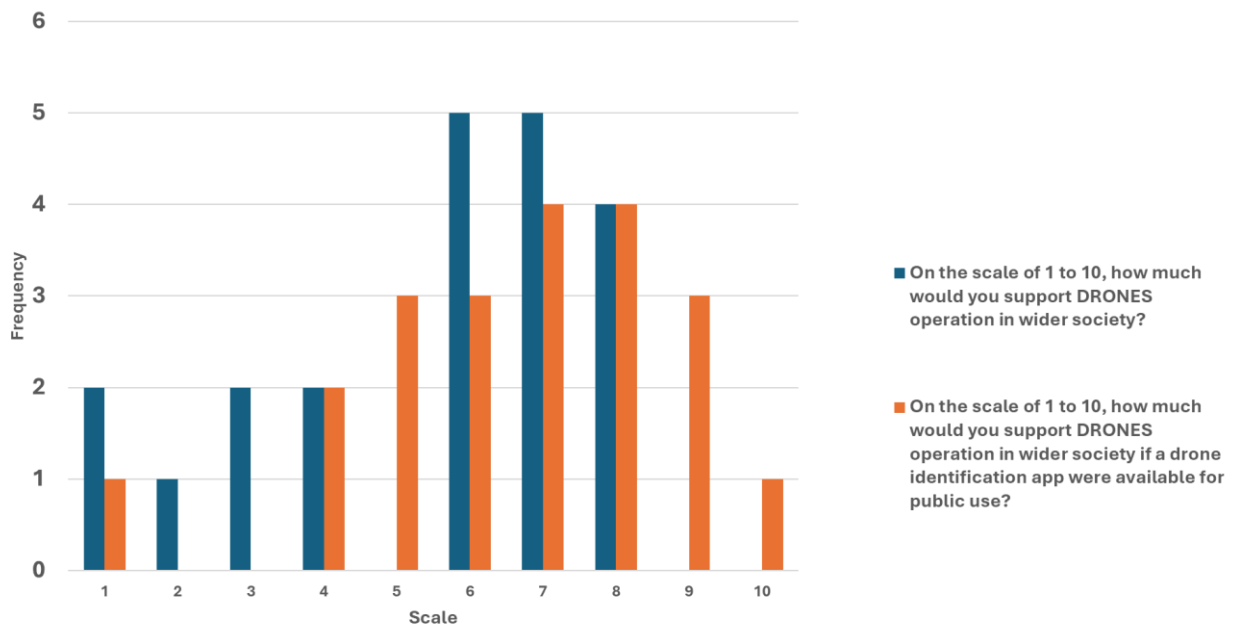


Figure 6: Distribution of public support ratings for drone operations in wider society with and without a public drone identification application

4. SUMMARY

This study highlights the critical role of transparency and accountability in shaping public acceptance of drone operations. The findings suggest that the absence of identifiable information creates uncertainty, reduces accountability, and ultimately undermines public trust in drone technology. On the other hand, clear and accessible information regarding a drone's identity, operator, and operational purpose appears to reduce anxiety and improve perceptions of legitimacy and safety. Participants also indicated a willingness to take a more active role in monitoring drone activities, suggesting that public-facing drone identification systems could support a participatory governance model in which members of the public act as informal co-regulators alongside authorities. Furthermore, drone identification was perceived not only as a transparency mechanism but also as a practical tool for risk reduction, privacy protection, and misuse deterrence through improved accountability. These findings suggest that public access to drone identification information may contribute to building greater societal trust and acceptance of drone integration into everyday environments. Future work will extend this exploratory qualitative research through a larger-scale public survey to quantitatively validate these findings and examine broader public attitudes towards the adoption of drone identification systems.

REFERENCES

- Aydin, B. (2019). Public acceptance of drones: Knowledge, attitudes, and practice. *Technology in Society*, 59. <https://doi.org/10.1016/j.techsoc.2019.101180>
- Boucher, P. (2015). 'You Wouldn't have Your Granny Using Them': Drawing Boundaries Between Acceptable and Unacceptable Applications of Civil Drones. *Science and Engineering Ethics*, 22(5), 1391–1418. <https://doi.org/10.1007/s11948-015-9720-7>
- Braun, V., & Clarke, V. (2022). *Thematic analysis: A practical guide*. Sage.
- Bryman, A. (2012). *Social research methods / Alan Bryman* (4th ed.). Oxford University Press.

- Chaisit, I., Hubbard, E.-M. & Lepper, P. (2024). Enhancing public acceptance of the Advanced Air Mobility (AAM) ecosystem technology: Exploring conceptual theoretical frameworks and regulatory support. *2024 International Conference on Unmanned Aircraft Systems (ICUAS)*, Chania, Crete, Greece, pp.324–330. <https://doi.org/10.1109/ICUAS60882.2024.10556838>
- Clothier, R. A., Greer, D. A., Greer, D. G., & Mehta, A. M. (2015). Risk perception and the public acceptance of drones. *Risk Analysis*, 35(6), 1167–1183.
- Eißfeldt, H., Vogelpohl, V., Stolz, M., Papenfuß, A., Biella, M., & Belz, J. (2020). The acceptance of civil drones in Germany. *CEAS Aeronautical Journal*, 11, 665–676. <https://doi.org/10.1007/s13272-020-00447-w>
- Khan, R., Tausif, S., & Malik, A. J. (2018). Consumer acceptance of delivery drones in urban areas. *International Journal of Consumer Studies*, 43(1), 87–101. <https://doi.org/10.1111/ijcs.12487>
- Luppici, R., & So, A. (2016). A technoethical review of commercial drone use in the context of governance, ethics, and privacy. *Technology in Society*, 46, 109–119. <https://doi.org/10.1016/j.techsoc.2016.03.003>
- Palmer, C., Hubbard, E.-M., Grant, R., & Goh, Y. M. (2025). Personas to inform cognitive interaction with a digital twin. *Journal of Industrial Information Integration*, 47, 100893. <https://doi.org/10.1016/j.jii.2025.100893>
- Sabino, H., Almeida, R. V., De Moraes, L. B., Da Silva, W. P., Guerra, R., Malcher, C., Passos, D., & Passos, F. G. (2022). A systematic literature review on the main factors for public acceptance of drones. *Technology in Society*, 71, 102097. <https://doi.org/10.1016/j.techsoc.2022.102097>
- Smith, A., Dickinson, J. E., Marsden, G., Cherrett, T., Oakey, A., & Grote, M. (2022). Public acceptance of the use of drones for logistics: The state of play and moving towards more informed debate. *Technology in Society*, 68, 101883. <https://doi.org/10.1016/j.techsoc.2022.101883>
- Stolz, M., Papenfuss, A., De Albuquerque Richers, G. C., Bahn Müller, A., Syed, A. M., Gerndt, A., Fischer, M., Wegener, J., Lieb, T. J., & Biella, M. (2023). A mixed-method approach to investigate the public acceptance of drones. *CEAS Aeronautical Journal*, 14(4), 835–855. <https://doi.org/10.1007/s13272-023-00693-8>
- Tan, L. K. L., Lim, B. C., Park, G., Low, K. H., & Yeo, V. C. S. (2020). Public acceptance of drone applications in a highly urbanized environment. *Technology in Society*, 64, 101462. <https://doi.org/10.1016/j.techsoc.2020.101462>
- Tepylo, N., Straubinger, A., & Laliberte, J. (2023). Public perception of advanced aviation technologies: A review and roadmap to acceptance. *Progress in Aerospace Sciences*, 138, 100899. <https://doi.org/10.1016/j.paerosci.2023.100899>
- Upadrasta, V., Hamdan, J., Leitner, R., & Kolrep, H. (2022). Who Are the Stakeholders of Drone Use? Roles, Benefits, Risk Perceptions, and Solutions. *Lecture Notes in Networks and Systems*, 319, 572–579. https://doi.org/10.1007/978-3-030-85540-6_72
- Wang, N. (2025). “Trusting the Sky!”: Expert Perceptions Regarding Public Acceptance of Urban Drones. *International Journal of Technoethics (IJT)*, 16(1), 1-26. <https://doi.org/10.4018/IJT.387388>

Wang, N., Mutzner, N., & Blanchet, K. (2023). Societal acceptance of urban drones: A scoping literature review. *Technology in Society*, 75, 102377. <https://doi.org/10.1016/j.techsoc.2023.102377>