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"Trusting the Sky!": Expert Perceptions Regarding Public Acceptance of Urban Drones

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ABSTRACT

Drones offer great potential as intelligent mobility solutions, yet challenges remain to their successful integration in society. This study analyzed experts' perspectives regarding public acceptance of urban drones in the Swiss context, with the aim of improving the understanding of the underlying values affecting acceptance. Trust emerged as the key to public perceptions, and critical to establishing trust is connecting more deeply with the public through integrating trust-building mechanisms, aligning with societal values resonating with the public, and involving a wider range of experts in shaping governance strategies. As conclusion, a responsible innovation framework and more effective implementation approaches can provide additional insights into how to build trust around an accepted set of values that serve the public good. This points towards an important next step – developing a process enabling consensus to be reached and ethical standards to be established.

KEYWORDS

Societal Acceptance, Urban Air Mobility, Public Perception, Expert Opinion, Thematic Analysis, Value Sensitive Innovation

INTRODUCTION

Unmanned aerial vehicles (UAVs), commonly referred to as drones[1], offer the potential to transform urban mobility infrastructure, provided that they are smoothly integrated into urban life (Wang et al., 2023; Wang et al., 2025; The BRIDGE Lab, 2023a, 2023b, 2024). Such integration hinges, on the one hand, on acceptance by the general public, and on the other hand, on involvement of stakeholders who manage drones' development, deployment, and operations. Scholarly work has examined public acceptance of drones in different contexts and use cases (Cetin et al., 2022; Kellerman & Fischer, 2020; Komasová, 2021; Miethe et al., 2014; Sabino et al., 2022; Smith et al., 2022; Tan et al., 2021), much of it using surveys or interviews with the public to gauge attitudes and acceptance factors related to drones.

Unlike existing studies, our research adopted a broader lens regarding drone implementations by tapping into expert perspectives, such as those gleaned from key stakeholders (Wang et al., 2025). Experts provided a distinct angle on public acceptance, as they offered insights regarding how the public's attitudes to drones may inform design and policy decisions (Wang et al., 2025). The question was posed: Do experts view public attitudes as a foundation for exploring and defining values, or simply as a way to identify the path of least resistance in how drones are developed, deployed, and managed?

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The current study is situated in a research project consisted of three components: (1) reviewing academic literature to map out existing discussions around urban drone acceptance (Wang et al., 2023); (2) surveying a cohort of Swiss drone experts to understand their perspectives on acceptance issues and the operational challenges they have faced (Wang et al., 2025); and (3) undertaking semi-structured interviews with some experts from the same cohort to delve deeper into the underlying values at stake (current study). The study aimed to answer three research questions: (1) what factors, both negative and positive, have influenced societal acceptance of urban drones; (2) based on these factors, in what ways experts have responded to public attitudes toward, and perceptions about, urban drones; and (3) whether these factors could be used to develop ethical standards to facilitate future development and integration of drones into society.

The latter question is important since, as many authors have pointed out, there can be a wide difference between a technology being socially accepted and being ethically acceptable (Asveld & Roeser, 2009; Grunwald, 2000; Hansson, 2003; Taebi, 2017; van de Poel, 2016). Policies and design choices prioritizing social acceptance have often followed the path of least resistance, aiming at a smooth rollout of technology to avoid backlash. In doing so, however, they have neglected ethical acceptability, i.e., whether that technology has aligned with moral principes or values. At the same time, it has also been acknowledged by the community that a purely normative focus—one that ignores empirical input—risks overlooking the impact of relevant real-world conditions, thereby potentially perpetuating bias and discrimination (Landes, 2024; Simon et al., 2020; Taebi, 2017).

This is particularly critical in the case of the so-called "socially disruptive technology," as their disruptive effects may be felt not only on social and institutional levels, but also in terms of more fundamental ethical norms, concepts, and beliefs (van de Poel, et al., 2023). An ethicist carrying out an "armchair" study of the ideal framework, within which to develop technologies responsibly, lacks the capacity to understand how those technologies affect all within a society, and thus lacks the ability to hone ethical standards accordingly (Landes, 2024). A method must, therefore, be found to bridge the gap between societal acceptance and ethical acceptability. In response, this study attempted to, firstly, understand how experts have perceived that gap, and secondly, begin to consider how that gap could be better navigated and, ultimately, bridged.

The following thematic analysis contributes to the development of normative standards in two ways. First, it provides empirical data regarding the values important in public acceptance of drones, in this case from an expert perspective. While these values may not be in themselves normative, they offer critical information about what the public needs for accepting urban drones—this information should be fed into future normative processes to ensure that any resulting ethical standards achieve consensus. Second, it offers insights into the gap between empirically derived studies on societal acceptance and normatively oriented work on ethical acceptability. As this study revealed, trust in the drone operational framework was essential to acceptance, and yet a gap existed in how experts translated this value into their design and policy decisions, possible ways in which a novel approach may be developed for bridging this conceptual gap can be further contemplated.

THEORETICAL FRAMEWORK

Understanding how people accept technology is key to successfully adopting digital innovations. According to Fraedrich and Lenz (2016), acceptance means actively agreeing to someone or something—it is not an attitude of simple tolerance, or the absence of explicit rejection. Within this context, the technology acceptance model (TAM) offers an established theoretical foundation focusing on perceived usefulness and ease of use to predict acceptance of any technology (Davis, 1989; Venkatesh & Davis, 2000). TAM has been applied to different environments, systems, tasks, and subjects (Lee et al., 2003). The model has later been combined with other theoretical concepts, culminating in the unified theory of acceptance and use of technology, which included performance

expectancy, effort expectancy, social influence, and facilitating conditions, as well as moderating variables (Venkatesh et al., 2003).

Among various counterparts to TAM, the theoretical framework of acceptability (TFA) offers a comprehensive analysis of both quantitative and qualitative data. TFA emphasizes seven empirically derived dimensions: user feelings, perceived effort, ethical considerations, understanding of the system, trade-offs, expected outcomes, and confidence in adapting to the system (Chen et al., 2022; Sekhon et al., 2017). Furthermore, a wide variety of theories exists in the literature, measuring technology acceptance in different contexts (Marangunić & Granić, 2015). The scholarly discourses of technology acceptance show an inherent complexity, with different frameworks and theories attempting to capture multiple dimensions (Momani & Jamous, 2017). Ultimately, while these models provide structured approaches to the understanding of technology acceptance, the key determinant is whether the specific technology and its related services benefits the public, and how society's evolving values, interests, and needs shape the trajectory of its development and deployment.

In recent decades, scholars have shown an increasing interest in social acceptance of technology—a factor that has proven critical in successfully implementing new and emerging technology (Alhakami & Slovic, 1994; Gupta et al., 2012; van Alphen et al., 2007). The discourse focused on the different elements in acceptance of technology—risk, benefit, and trust paradigms were seen as key factors. Consequently, it has become critical to recognize how these factors depended on technology's perceived uses—who used it, where it was used, and what it was used for (Sjöberg, 2002), as well as relationships between perceived risks and benefits (Alhakami & Slovic, 1994).

Another key factor from a societal perspective was the emergence of controversies, or negative stereotypes regarding technology, that have hindered acceptance (Horst, 2005; Lusk et al., 2014). In this sense, society's adoption of, and adaptation to, a technology depended on the perceptions, emotions, and belief systems of all involved actors (Im et al., 2011). Understanding and addressing these different aspects has become vital as, ultimately, they could shape the trajectory of a technology's integration in and impact on society at large. This indicated that the discourse has moved beyond just the social aspects, and has extended into a broader societal realm including the ethical, legal, and regulatory aspects.

Societal acceptance, thus, can be seen as a reflection of public attitudes, institutional practices, legislation, norms, and most important of all, values (Fraedrich & Lenz, 2016). Case studies exploring how organizations integrate new technologies into their operations have reflected this multi-faceted terrain (Ali et al., 2019). They demonstrated the importance of understanding how technology benefits society and affects the public more broadly (Ali et al., 2022), alongside how the technology promotes an organization's competitive edge and profits (Ali et al., 2021). These insights indicated that societal norms, moral principles, and values have shaped public attitudes toward technology; in turn, these attitudes have influenced institutional practices, legislation, and how widely—and in what ways—the technology has been adopted within society.

At the same time, public attitudes to a technology can also be shaped by those same practices and legislation, both through enabling and normalizing certain uses of technology, and through acting as a "proxy" for the public voice, such as responding to public concerns and fears (Ali et al., 2023; van Alphen et al., 2007). It has been increasingly understood that public reactions to technology depended not only on objective and subjective perceptions of risk and benefit, but also on people's imagination, myths, beliefs, intuitions, emotions, and overall worldviews (Berne, 2004). It has also been recognized that some determinants of societal acceptance of technology might be more relevant to specific technologies or particular regions of the world (Gupta et al., 2012).

While focusing on how a technology impacts the public both on a societal and individual level is central to the understanding of how and whether a technology will be accepted by the public, it is important to keep in mind that the public's attitude is not solely tied to the impact of that technology, but is rather the result of complex interaction between the different aspects of societal acceptance (Wang et al., 2023; Wang et al., 2025). The objective of

acceptance studies, thus, should go beyond simply showing that the public does not resist a new technology, but rather demonstrating that acceptance is based on an alignment of the technology with values (Wang et al., 2025). This study aimed precisely to contribute to the theoretical embedding of societal acceptance—by examining how acceptance has been understood by experts in drone design, management, and policy development; identifying how far they have translated those understandings into practice; and exploring whether public attitudes might be leveraged to develop a genuinely values-based design and policy framework.

METHOD

Study Design

Understanding public acceptance of new technology goes beyond surveying opinions on risks and benefits, or polling support or rejection of that technology; it requires exploring the deeper, underlying factors through a multidisciplinary approach (Upham et al., 2015). Guided by this rationale, experts were interviewed in this study regarding factors influencing public acceptance of urban drones—by learning how experts viewed those factors as playing into design and policy choices, it assisted with a richer and fuller understanding of those factors.

Within this conceptual framework, three aspects were of particular importance. First, what was meant by "acceptance" in the context of public acceptance needed to be distinguished from terms such as stakeholder acceptance, or political acceptance. Here, stakeholder acceptance referred to non-political organizations that either used technology or were impacted by its use; political acceptance referred to the level of policy support from government and relevant institutions (Upham et al., 2015). Public acceptance included not only the public's beliefs and feelings regarding the technology, but also their willingness to accept or even adopt the technology as part of their actual behavior (Fraedrich & Lenz, 2016).

Second, with respect to drone acceptance, it was not always explicit just what the acceptance "object" was for the public—it was not about the technology *per se*, but rather about the functions drones fulfilled within the social structure and their impacts upon that structure (Fraedrich & Lenz, 2016). Here, what was truly at stake was public's acceptance of the radical social changes brought by that technology in society (Gupta et al., 2012), including changes to pre-existing norms such as privacy (Gupta et al., 2012).

Third, at the outset of this study, the definition adopted of "expert" was based on Caley et al. (2014), as "someone with comprehensive and authoritative knowledge in a particular area not possessed by most people." In the context of urban drones, the above definition was extended to include those involved with drones on a professional level including: (1) private sector members, such as aviation or robotics industry, (2) public sector institutions, such as governmental and non-governmental organizations, and (3) academia, such as research institutions and universities. This rationale ensured that the participants not only had the required technical and/or social knowledge about drones, but were also involved in drone operation, implementation, and management in their daily work. This inclusive approach was essential when capturing and unpacking the nuances of perceptions about urban drones, enabling insights to be obtained into the dynamics of societal acceptance factors.

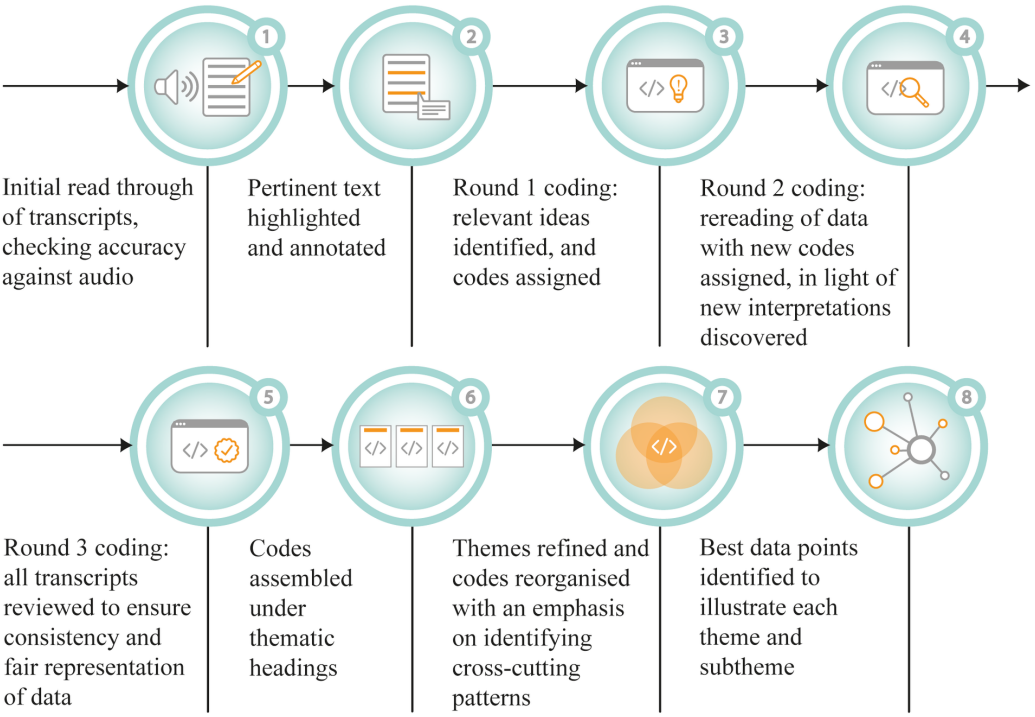
Analytical Approach

The study followed the method of reflexive thematic analysis as outlined by Braun and Clarke (Braun & Clarke, 2022; Byrne, 2022; Clarke & Braun, 2006). This method enabled the identification of unarticulated assumptions, and the reinterpretation of participants' statements in the light of those assumptions to uncover new understandings of why certain use cases were publicly acceptable. Such a method was instrumental in identifying new categories of rationalization that went beyond

the traditional scope of neutralization techniques, as well as the structural and social factors that corroborated with neutralization techniques.

Coding was undertaken semantically and inductively (Byrne, 2022). As the interviews were read and coded, themes were generated that shed a different light on earlier data and led to reinterpretation and hence recoding (Byrne, 2022). The coding and recoding, as well as the creation of themes, followed an iterative process, as captured in Figure 1. This ensured that the final themes were relevant to the data set and the research questions. The aim of this process was to identify cross-cutting patterns in the data, describing those patterns and, in the process, identifying any underlying assumptions and gaps in the participants' responses in a way that addressed the research questions.

Figure 1. General Workflow in Data Coding and Themes Identification



Participants

Interview participants were selected based on voluntary self-nomination from a prior expert survey carried out between 14 March 2023 and 16 May 2023, involving a cohort of 126 experts in urban drone implementation in Switzerland (Wang et al., 2025). These experts were originally recruited from the researchers' existing networks, and were later complemented by the experts' own professional networks. At the end of the survey, participants were given the opportunity to send an automated email to indicate their interest in participating in subsequent expert interview. This resulted in a total of 25 participants of the interview, including three female and 22 male experts. Consent was gained from all interview participants, in writing, prior to conducting the interviews. Except for one interview involving three members of the same profession, all interviews were carried out on a one-to-one basis.

Procedure

Data collection took place through semi-structured qualitative interviews. An interview guide was developed in advance and used to guide the interviews, with the possibility of following-up particular responses in more depth. The guide focused on the following key themes: the expert's background, their views on the current state of public acceptance of drones and the factors influencing it, challenges they faced to addressing acceptance, their opinions on existing regulations, and the role of experts in shaping the conversation around drone acceptance. In total, 23 interviews were conducted between 30 August 2023 and 11 October 2023; 17 were held in English and six in Swiss German. Interviews were carried out both digitally over Zoom/Teams and in person; all were audio-recorded. Interview duration ranged from 38 minutes to 81 minutes, with an average time of 69 minutes. Interviews conducted in Swiss German were translated into English; all interview recordings were subsequently transcribed.

DATA ANALYSIS

To check for transcription accuracy, the transcripts were reviewed while listening to the audio recordings. A subsequent read-through of each transcript was undertaken and data annotated to highlight pertinent areas of text and note initial thoughts on the significance of the highlighted text.

The coding process was next, as indicated in Figure 1, where interviews were assigned codes that captured commonalities across data points. Three coding rounds were undertaken. Round one consisted of generating initial codes. Round two consisted of the codes being refined as new perspectives on the data found. Round three ensured that all final codes were consistent with the datapoint they captured and identified any relevant data missed on the first readings. All data points and codes were recorded in a spreadsheet, which tracked, in separate columns, any changes in codes from those originally assigned in round one, and then to the final code assigned in round three.

The next stage involved identifying themes. To begin with, all codes were placed under thematic headings; the themes were then refined. This process involved finding ways to adjust the theme headings to better capture the underlying patterns in the data, and reorganizing the codes where necessary to better fit under different themes (Byrne, 2022). The focus was on how to unify the data under themes that were not merely summaries of the surface level data, but rather cross-cutting patterns that shed light on the research questions. Themes that did not have sufficient data were incorporated into other themes where possible, or else discarded. Care was taken not to lose sight of the overall data set, while identifying patterns that would enable the narratives to describe and explain the data. Once themes were identified, a spreadsheet was used to identify the data points that best illustrated points to be made under each theme.

RESULTS

Three main themes were identified through the analysis, each with three sub-themes. The first theme was "public attitudes toward drones," with sub-themes of "fear," "annoyance," and "openness." The second theme was "acceptance factors of drone use," and included the sub-themes of "cost-benefit calculation," "operating environment," and "normalization." The final theme was "need for establishing trust," within which were the sub-themes of "regulation," "operator," and "communication."

Figure 2 features the map of themes and sub-themes, demonstrating that the need for establishing trust emerged as a key analytical theme.

Figure 2. Map of Themes and Their Interrelationship

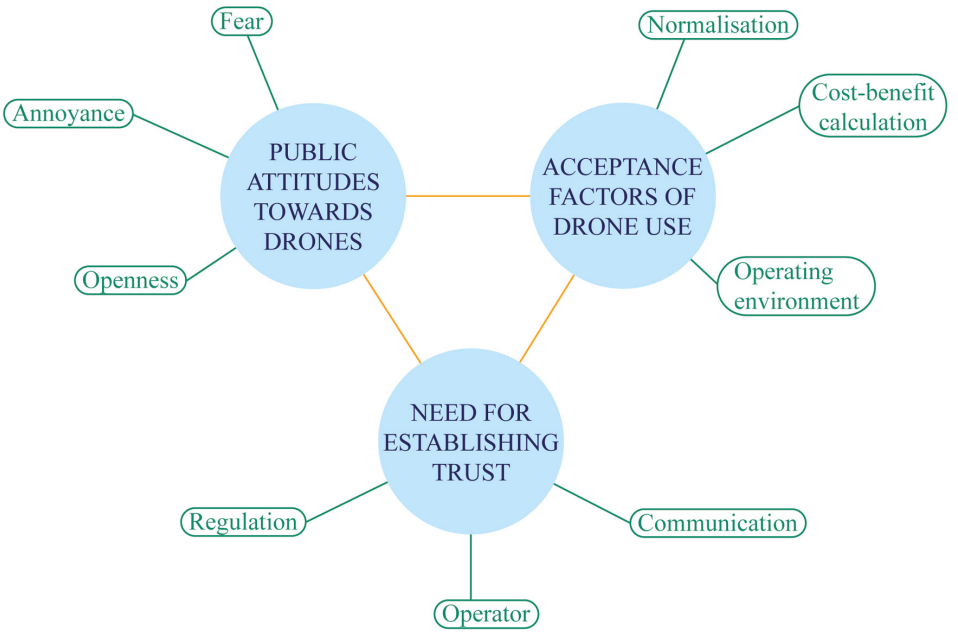


Table 1 sets out a list of example quotes connected to the points identified under each sub-theme.

Table 1. Example Quotes in Support of Thematic Analysis

Analytical Point	Example
I. PUBLIC ATTITUDES TOWARD DRONES [FEAR]	
Experts on public attitudes toward drones	"People are afraid that drones could fall down from the sky." "I think that for most other people, when they see a drone, they think, there's a camera on it and most people don't like drones because of that, they feel like someone is spying on them." "… that we may have swarms or fleets of drones that are flying everywhere."

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Table 1. Continued

Analytical Point	Example
Why experts did not share the public's fears	"There is so much technology behind it and we trust it." "We have cameras since long ago … but we were not using them. Now we're using them mostly for navigate." "The routes that we're flying are super fixed and predetermined like we're flying maps, they look like metro lines, it's not that we're flying everywhere." "As an expert you have to say, that's part of it and nothing happened at all and actually it's within the scope of what was planned, something happened, not really totally out of line." "You just can't have zero risk." "There is the perception side and then there is the statistical side."
Negative incidents and fear	"The drone crashes and generates some damage, and even if it wouldn't generate damage, would generate bad news." "People were also frightened of the new technology because … drones are connected to war."
Drone operator and fear	"It's because you don't see the corresponding person behind it and it actually it also frightens me." "During a hike a drone starts flying, but they never saw the pilot, and then I become critical; because I have no idea what's happening now, why is it happening? What's it for?" "People actually do pay attention when someone is flying and also look more closely, like what is he doing there? How is he flying and what is he observing?" "Yes, definitely. That's also the reason why we still have pilots on board of manned airplanes, pilots watching autopilot actually. Or programming the autopilot while they're on board. Actually, it could be done somewhere else on the ground, but for us humans we trust more if someone sits in front and pilots the whole thing … That's the human psychology."
Airborne nature of drones and fear	"It's something that's a little scary. It's something in the sky, especially in the urban environment and a lot of things in the sky that are circling around and flying through the top, you get scared somewhere. We humans are not used to trusting the sky above, actually there's not much there or the birds, they don't attack us, but now all of a sudden it has more objects and that scares something … Man just feels threatened by it. He can't quite assess whether this is in my range or not. As soon as he notices something, he feels it could hurt me." "… the spatial dimension as well that somehow being up there, maybe it feels like, OK, that's watching me." "… the air is kind of a free territory." "… could be more unpredictable, they could be like [flying] lower altitudes."
I. PUBLIC ATTITUDES TOWARD DRONES [ANNOYANCE]	

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Table 1. Continued

Analytical Point	Example
Experts on perceived public experience	"I think from the public perspective it's what they experience, which is noise, which is visual intrusion." "The sound of it, it's too loud they say."
Experts on their own experience	"[A drone] still makes noise. The model airplane already makes noise but a drone is even more intense." "[The noise is] like an insect." "For urban use of drones I would say it has to become much quieter." "I think that noise is the really huge issue for the industry."
Newness of noise	"When it is about accepting a new noise people is less open." "In higher frequencies because of the rotors. It makes you pay attention, it's something new." "I worked on Heathrow expansion [in] the UK for a couple of years and noise issues around Heathrow more broadly. The A380, which is an Airbus aircraft replaced the Boeing 747 on a lot of routes, that aircraft was actually quieter but because it was bigger, it was noticed by more people, actually noise complaints went up even though the sound was actually lower."
Foreignness of noise	"In the countryside such a drone is much more noticeable than in the city." "In Beijing, a lot of big cities, the noise … probably … just wouldn't be a problem because it's anyway super noisy."
Noise was relative	"You are less noisy than a car or motorbike or bus, and then … it's not a problem."
I. PUBLIC ATTITUDES TOWARD DRONES [OPENNESS]	
Openness as a general public attitude	"I think it's more people, they are curious about the technology still and they want to understand it." "It's only a minority of people that are … let's say completely technology averse and let's say just probably hate anything." "I think a lot of people think it's interesting technology and they are happy to see drones … it's like a toy and it makes fun and people like to see how it starts, how it's flying." "Experts are rather more skeptical than the general public, who mostly enjoy these things and find it exciting—it's still a bit of science fiction with a lot of room for improvement—there's room for fantasies and so on."
Openness connected to values of using drones	"People are very accepting [of] drones and their understanding is that they bring a lot of value." "Let's say air taxis … it piques people interest, it's a cool technology. But then if you dig a bit deeper, people think maybe it's not actually that useful." "In the beginning it was like negatively shocking and then ohh, actually they can do so much that I didn't know."

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Table 1. Continued

Analytical Point	Example
Reflections about negative attitudes	"If something was concrete then there was feedback, otherwise not." "Younger people who grow up with it are likely to have higher acceptance than perhaps in another age category, where they may perceive it as more bothersome and unnecessary." "There is a more skeptical attitude in German-speaking Switzerland than in French-speaking Switzerland. There, technologies are more embraced. An explanation there could also be that somewhere, I don't remember exactly, in Lausanne, there is a kind of tech/drone valley where there is a lot of goodwill toward technology."
II. ACCEPTANCE FACTORS OF DRONE USE [COST-BENEFIT CALCULATION]	
Acceptance depended on the public weighing perceived values of drone use against fears/annoyances	"A life of someone is worth more than a short amount of time that you get annoyed by noise." "[If it was] a commercial thing and you just want to do transports and it's annoying thing like you have a new source of noises, then I guess it's very difficult to install this or to fight for acceptance." "If you're transporting material somewhere in a disaster area, then it's a huge opportunity, and then no one even cares if five drones crash there."
How values of drones were understood	"[Drones need] to be of use for the majority of people." "How can that be utilized by as many people as possible." "Because of the use case and because of the obvious added value it brings to society."
High acceptance for humanitarian/emergency use cases	"Everyone can relate to oh yeah there needs to be a medication there in one minute." "It's a medical flight, or if it's yeah, flying to a hospital … obviously they understand why that's happening." "The blue light organizations, they should really have extensive powers from the outset to be able to do their missions." "In the blue light sector, you will certainly have different requirements … you can exceed certain things that you are otherwise not allowed to do as a private person because it is more important for the operation."
Significance of trust in operator	"These operators, like SBB [Swiss Federal Railways], who operate drones, from my point of view, whether it's Astra or Geomatik, the trust in these people is relatively high, and that should be utilized. If they implement something, society probably assumes that they are doing it correctly, and perhaps people just don't understand it at the moment."
Acceptable use cases	"If it's for a scientific reason here in Switzerland I think yeah, most of the people say it's OK." "They [the public] accept certain applications, use of drones for research." "When I see a survey drone on the ground, there are no questions about it, that's accepted." "Against traffic jams to make analyses, then it's ok." "Or even the public transportation if they would do inspections of railways that would probably have a higher acceptance."

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Table 1. Continued

Analytical Point	Example
II. ACCEPTANCE FACTORS OF DRONE USE [OPERATING ENVIRONMENT]	
Drones were more annoying in a rural context	"It bothers you when you want to contemplate the landscape and then you hear this, this bee noise." "In Beijing, a lot of big cities, the noise … probably … just wouldn't be a problem because it's anyway super noisy."
Acceptance was harder in an urban context	"Especially in an urban environment it's going to be difficult." "I have the feeling that in urban areas drones are much more likely to be noticed by someone. There are many more people around, and you see something flying around."
Importance of personal connections	"Of course, if you're used a little bit maybe to noise because if you live near to a field, then other farm operations that could happen during Sunday if the weather is right, then there should be no issue to mow or to do any farm works. This is yeah, people are quite used to it and I think it's also because you have a, maybe a better connection to your local farmer than … somewhere else maybe." "We sent the letter to all the people living underneath the fight route so they know beforehand who is going to fly over their house and … where they can call or write to me an email."
II. ACCEPTANCE FACTORS OF DRONE USE [NORMALISATION]	
Normalization and acceptance	"Acceptance increases with the mass that gets into the air. The more drones are in the air, the more they will be accepted."
Reflections on generalizing from emergency use cases	"Make it one drone per day and start with a very positive connotation. It's the same positive connotation … when you see kind of an ambulance … you're like, OK, it makes some noise, and it annoys me, but those guys [are] gonna save someone." "I don't think the emergency in general is a good basis to make a more general case, you know, emergency situations are always special." "The challenge is for a company which does not have a use case in the emergency field. Then you wouldn't want to wait for this field, right? You want to act proactively." "If you are able to showcase applications that are relevant for human beings, for animals or whatever for society, acceptance might increase. But that's not where our niche is usually, and that's not where the big money can be earned."
Risks attached to normalization as a strategy	"With great exposure there also comes more persons being against it." "You can never have a zero risk." "The point is that any … cyber barrier you can put in place, it will eventually be broken of course." "First drone incidents are gonna show up in news."
III. NEED FOR ESTABLISHING TRUST [REGULATION]	

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Table 1. Continued

Analytical Point	Example
Regulations and acceptance	"Regulations will arise in order to reassure people." "If you are not safe enough then you will not be permitted to fly or other way around if you are permitted to fly then it would mean that you … fulfill the safety requirements to be airworthy, to actually be … in the air." "When a device is certified by a certification authority, it is automatically considered safer, and I strongly assume that today's drones are already very safe in part. But if that has also been certified and verified, then it looks even different."
Trust in institutions and acceptance	"In particular in Switzerland because of the confidence there is in public institutions." "I assume in good faith that in Switzerland only devices are used that can do what they are intended for."
Need for enforcement	"I think we do have the laws and regulations but it is partly very difficult to really enforce the respective rights." "Having a channel to complain and also catching the bad guys that is going to be a challenge."
Regulations as limits on drone development	"The regulatory framework that doesn't allow the technology to fully show what it's capable to do." "Technologies are not created by laws. Technologies are created by people who have freedom and crazy ideas."
III. NEED FOR ESTABLISHING TRUST [OPERATOR]	
More trusted operators	"People think that business controllers are more experienced. They are technologically better educated than governmental controllers." "A state entity … everybody knows what they stand for, whereas you know a corporate entity, you don't really know." "If it's coming from an organization I think it is regulated and if it comes from a private person, I'm not so sure if this person knows what she's allowed to do and what not."
Values of the operator	"If you see that it's a company operating the drone and … connected to some values you have, it's different than if you don't know the operator or you don't know what they're doing exactly. There may be more concern about what's going on there." "Among commercial companies themselves, I feel that the brand probably matters a lot. If a company like Migros or Coop [Swiss supermarkets] were to do something, I could imagine that because they are very socially accepted … If Migros were to start with food deliveries, for example, the acceptance would be higher than if a lesser-known store started." "We always wear our jacket. It's obvious what we're doing and what the drone is doing."
III. NEED FOR ESTABLISHING TRUST [COMMUNICATION]	
Importance of communication	"Resistance arises above all when people do not feel that they have been consulted." "If you explain to people what you are doing, they think it's great."

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Table 1. Continued

Analytical Point	Example
More trusted entities	"ETH University does something like this, that the trust is there. These are people who know what they are doing, they are intelligent. I think they are competent people. In such institutions the competence is very highly recognized and that differs from purely private which you cannot accurately assess." "I think it's certainly good when private companies communicate what they're doing, but I'm afraid that people might see it too much as advertising, so the company just does it to push itself."
Need for data and joint communication	"Actually what is the baseline to measure noise for drones and what is exactly the limit and so on, it's actually not even there." "To come to joint conclusions subscribed by experts of different fields, then these conclusions would have a convincing character for the public."
Content of communication	"What one is working on, how the drones may be equipped, what is allowed and what is not, that this is communicated." "Prior communication when the private properties are flown over, so first of all the communication is advance."

Public Attitudes Toward Drones

Fear

Participants believed the public had fears regarding safety, data protection, and environmental impact; the experts were quick to state that they did not share these fears. While participants were clear that safety risks did exist, they pointed out that while an expert would view a drone crash as an opportunity to improve the technology, the public would take it as a sign that drones were unsafe.

Participants drew attention to the fact that drones being airborne meant that the public saw them as threatening—ground-based vehicles, such as cars or trains, are contained within visible roads or tracks; there are, however, no obvious barriers between a drone and a person. Traditional aircraft typically fly at high altitudes along fixed routes, whereas drones fly lower and along less predictable paths—this made drones potentially more concerning to the public.

Participants blamed the media for planting the idea of drones as "malicious" in the public's mind. In this context, the most common fear was around drone swarms—this invoked a notion of "boundary-less air," which had even greater resonance with the public. The automated aspect of drones was mentioned by participants as a source of fear, provoking questions around who was flying drones, what they were used for, and the operators' expertise level. Several participants mentioned the use of drones in the war in Ukraine as triggering public fears around drones as a weapon of war.

Perceptions of risk were highlighted as more important than objective risks. In that respect, trust was mentioned as essential for the public to accept drone technology. One participant, for example, noted that people's fears regarding technology lessened when they knew a human was involved, even if that fact did not objectively reduce risk.

Annoyance

Participants linked annoyance more directly than fear to the public's actual experience with drones—participants often agreed with the public with respect to negative experiences around noise, for example. It was clear that that annoyances were subjective, with some pointing to the "newness" of the noise as making a difference to acceptance levels. Even when the noise was lower than anticipated, the fact of it being "new" seemed to cause annoyance.

In addition, the more unfamiliar the intrusion, the more annoyance was felt by the observer. For instance, against a background of peace, a buzzing drone seemed more annoying than when experienced against an already loud and chaotic city sonic background. Connected to this was that even were the drone indeed noisy or visually intrusive, it was still considered acceptable if it were shown that it was less noisy than other, currently available, solutions.

Participants weighed the annoyance caused by drones against their potential to save lives. They observed that commercial drones—whose benefits were less immediately apparent—were often harder for the public to accept. Interestingly, when explaining why they believed humanitarian and emergency uses would be more readily accepted, participants emphasized the values represented by the drone's purpose, rather than the operator's identity.

Openness

Several participants felt that members of the public were more open toward drones than expected, and that usually the public gave feedback on a drone project only when submitting complaints. Participants may have held an overly negative view of public attitudes toward drones, because they were usually the ones receiving complaints.

Other responses connected openness to the public's belief in the value drones could potentially offer. If the public did not see the value of drones, then any initial openness would wane. However, participants noted the risk of disillusionment if public expectations about the value of drones were raised but ultimately unmet.

A few participants pointed to the fact that different segments of society displayed varying levels of openness to drones. For example, the fears identified as deriving from the novelty of technology did not apply to the younger generation, who had experienced technology regularly. While some pointed to cultural factors affecting openness, such as conservatism, others suggested that what seemed like a cultural difference could be explained by a difference in technology exposure.

Drone Use: Acceptance Factors

Cost-Benefit Calculation

Participants did not necessarily believe that the public had to benefit from drone use in a direct way; the most widely accepted use cases were humanitarian and emergency applications, even though they directly benefitted only a small number of people at a time. Participants' understanding of "benefit" appeared to be linked less to the number of people who directly gained from it, and more to how many people shared the underlying value and recognized it as an important collective good. Such values were often referred to as societal values, in that that they would benefit all members of society.

It was clear that participants believed societal values could be ranked, and that saving lives trumped others regarding influencing the public to accept drone use; for example, participants agreed that humanitarian and emergency use cases should be less stringently regulated than others. Responses also indicated that fears and concerns carried less weight when lives were at stake—that operators could "get away" with much more, and that the public's comfort with relaxing regulations derived from the importance attached to the value of saving lives.

Participants noted that public perceptions differed when a trusted organization, such as the Swiss Federal Railways, operated the drone—leading to the belief that it was being used appropriately. Likewise, drones that participants considered highly acceptable were those operated by trusted university or government bodies—although when explaining their acceptability, the focus was placed on the values being promoted. At the same time, participants did not explicitly link their observations about the public's fear of unknown drone operators to the role of trust in gaining public acceptance. As a result, the public's cost–benefit assessments may have reflected not just competing societal values, but also which organizations were trusted to uphold those values.

Operating Environment

At first glance, participants' responses to drone use in urban *versus* rural environments revealed an apparent tension. In a rural area, the intrusive nature of a drone was regarded as more prominent than in a city; the general agreement was that acceptance would be lower in urban areas. Participants explained that even though the noise was more disturbing in rural areas, there were fewer people around to complain.

One participant suggested that people had a stronger connection to the local environment—and to individuals such as local farmers. This connection fostered trust, as people were more likely to believe that the farmer had a valid reason for carrying out a noisy operation, especially when they valued the farmer's work and livelihood. Such connections, according to the participant, were easier to build and maintain in less populated areas.

Many participants talked of the need to inform people who may be affected by a project in advance, thereby making space for concerns to be raised and addressed. In areas with fewer inhabitants, this was far easier to execute, with communication frequently based on already established trust. This implied that, rather than simply focusing on reducing the annoyance of drones in urban areas, working to establish trust could itself be a means to reduce annoyance and increase acceptance.

Normalization

Participants mentioned "normalization" multiple times as one way to increase public acceptance of drones. This idea was tied to the belief that annoyance stemmed from drones being new and unfamiliar; participants felt that increased exposure to the technology could lead to greater public acceptance. The most suggested approach to normalization was to begin with widely accepted use cases, such as humanitarian or emergency applications, to gradually accustom the public to the presence of drones.

One participant, however, offered that the public accepted emergency use of drones precisely because they did not see those use cases as generalizable, as emergency cases were by nature one-offs; thus, they were not seen as the start of a "slippery slope" toward delivery drones. This suggested that when expressing acceptance of emergency cases, environmental protection was a value the public responded to—specifically the avoidance of drone swarms filling the sky.

Another way to interpret this value was from a sustainability perspective, implying that the public needed to be reassured that any long-term impact of a drone use case would not be detrimental, either environmentally or socially. This value could play a much more important role in the public's reaction to different drone use cases than participants recognized which, in turn, would provide a strong counter to the potential of normalization as a strategy.

Need for Establishing Trust

Regulation

Many participants pointed to the regulatory framework as a means of responding to public concerns, with one stating that regulations could increase perceptions of safety. Crucially, participants also noted the need for trust in public institutions, demonstrating the opinion that regulations alone would not promote acceptance of drones, especially in cases where trust in public institutions was low.

The comments suggested that strengthening the public's trust in institutions would be an effective way to strengthen public trust in drone use. Strengthening institutional trust also required holding operators accountable to relevant regulations—one area some participants identified as a weakness in current drone operations.

Operator

Participants consistently emphasized—and agreed—that public acceptance of a specific drone use depended largely on the level of trust in the operator. This remained true even though, when justifying why certain use cases were acceptable, participants often focused more on how these uses aligned with or

promoted societal values. Private individuals, especially those unknown to the public, were not often accorded high trust. The public's main concern was the lack of an individual's connection to a legitimate organization—something that would infer expertise.

Participants also shared that, because a trusted organization often stood for certain values, their personal focus on values could be perceived as closely tied to the level of trust placed in that organization as a drone operator. Furthermore, some participants noted that drawing attention to such an operator, as well as their connection to it, could be a "better" way to build trust—compared to any other means of communication.

Communication

Participants' statements suggested that the main purpose of communication was to convey information to the public about drones, and to persuade them that drones were "great." Participants did stress, however, that such communication should be trustworthy. For example, in terms of who should execute the communication, participants emphasized the need for trusted, objective spokespersons, such as university researchers. Regarding private companies, participants held that, in general, a perceived lack of objectivity could undermine public trust.

Other suggested ways of building trust included the need to speak based on clear, empirical evidence—something that some participants believed was currently lacking. Additionally, the idea was raised that the trustworthiness of expert opinions could be established through expert corroboration. Regarding content, participants focused on communication that served specific projects, rather than broader societal values or an organization's track record— although these latter aspects were shown to be important.

DISCUSSION

Values Underlying Acceptance Factors

Participants emphasized the need for drones to be seen as promoting societal values. The earlier analysis of participants' views regarding which drone applications the public would likely accept reflected findings from other studies: Participants believed that "blue light organizations" and research-related drones would receive strong public support, while hobby and commercial drones would be less widely accepted (Kellerman & Fischer, 2020; Komasová, 2021; Miethe et al., 2014; Sabino et al., 2022; Smith et al., 2022; Tan et al., 2021; Wang et al., 2023; Wang et al., 2025). Participants assumed that the important factor regarding whether the public would accept particular drone applications was the public's perception that the benefits outweigh the costs—this benefit was specifically a societal benefit, as opposed to individual gains. A list of societal values either mentioned directly by participants, or inferred from the use cases they considered acceptable, is outlined in Table 2.

Table 2. Societal Values Identified in Interviews

Value	Example
Visually pleasant environment	"That we may have swarms or fleets of drones that are flying everywhere."
Peaceful environment	"I mean always, you always hear a drone in the skies and it bothers you also when you go hiking in the mountains. It bothers you when you want to contemplate the landscape and then you hear this, this bee noise."

continued on following page

Table 2. Continued

Value	Example
Unpolluted environment	"You save like X gram of CO2 emission, people say well, that's a good thing then."
Saving lives	"When you explain to people the benefits of being able to access areas and provide fast medical service in areas that otherwise would not get either the same speed of delivery, and there is certain acceptance."
Security of persons	"And then the security, what will happen if the drones fall on my head?"
Security of property	"And if I'm owner of the house, then of course I do have a security issue. If a drone of a certain person crashes into my window then I have to replace my window. It's the damage and I would like to know who is going to pay for the damage."
Privacy	"What about my privacy when there's a drone buzzing around in front of my balcony."
Data protection	"Transparency and whether it's clear for what [it] is used and what will happen with imagery."
Economic opportunity	"People find it fascinating. They don't necessarily feel that, you know, replacing the postal service person with this robot is something that they would like to have because they, you know in the end you know, people's lives are always about jobs."
Social cohesion	"I'd rather have someone to talk with. That's I think the sentiment here."
Peace	"Some people that are scared about the military applications, especially because there are predictions that the warfare of the future will happen with mini-drones or swarms of mini-drones."
Furthering knowledge	"If it's for a scientific reason here in Switzerland I think yeah."
Food security	"To bring more efficiency to an aspect of the farming operation, then that's certainly commented on more positively."
Animal welfare	"Most of the people say it's okay if you can save little animals in the fields."
Entertainment	"It could be a number of things, like it could be a drone that's kind of televising public events, or it could be … the network drone that's providing an aerial display."

An important value that emerged in the discussion was sustainability. Although not explicitly noted by participants, the analysis showed that sustainability was a key value at play in the public's acceptance of humanitarian and emergency use cases, deriving from participants' own emphasis on public fears regarding drone swarms. Sustainability required thinking about the impact on people, the environment, and economic feasibility, both currently and into the future (Bigliaddi & Filippelli, 2022). An innovation could have different impacts on a society, including unintended consequences and cumulative detrimental effects (Eppinger, 2021). The limited nature of humanitarian and emergency use cases did not trigger fears of future unacceptable detrimental effects. When the public understood that use cases were sustainable, then this directly addressed the fear that drones would fly everywhere and anywhere. From this perspective, delivery drones were not necessarily seen as entirely unacceptable to the public—provided they were implemented in ways that reassured people about their sustainability. In particular, public concerns needed to be addressed about the risk that drone use might escalate to harmful or excessive levels.

Participants believed that the public would accept an extensive list of use cases in addition to emergency and humanitarian purposes, such as for research, surveying, scientific work, or traffic analyses. Viewing these use cases in the context of the social system, as opposed to just trying to understand their benefits in one direction, led to an explanation of their acceptability that drew additionally on the time-bound nature and limited number of drones used in the operation. It also provided another explanation for participants' view that the public found delivery drones unacceptable due to their lack of clear societal benefit—namely, the concern that these use cases had no obvious limits. If profits

continued to rise, drone use could keep expanding, heightening the perceived threat to a peaceful environment and clear skies. This was particularly important given that most members of the public were not themselves benefitting from the drone use and may have experienced only the negative effects of drones flying over their houses. Participants held that the emergency or humanitarian use cases were highly likely to be accepted because the public could understand that drone use would improve public services, thereby supporting general societal wellbeing. In the absence of personal benefit, however, the public only imagined societal benefit because of trust in the drone operator.

Trust in organizations was argued to be a key acceptance factor that played a larger role than participants had realized. For example, in discussions about cost–benefit calculations, participants acknowledged the importance of promoting societal values. However, they concluded that the public tended to weigh those values against the potential negative impacts of drone use—without fully considering how trust in the operating organization might influence whether those values were actually upheld (Vermaas et al., 2010). Similarly, when discussing the operating environment, participants noted that rural areas had fewer people, but many concluded that acceptance was mainly due to fewer individuals being disturbed by noise—rather than because trust was established. This aligned with other studies showing that public acceptance often depended on trust in the active user of the technology, as perceived by so-called "incidental users." These relationships and perceptions have played an important role in fostering trust and acceptance in specific use cases (Inbar & Tractinsky, 2009; Inbar & Tractinsky, 2011; Montague & Xu, 2012).

Closely related to organizational trust was the view that building trust was not about repeating the safety features of drones, but about connecting with the public on a deeper level that involved taking into account values, norms, and beliefs. The need to establish trust provided a different perspective on the drone regulatory framework. For example, the regulatory framework in Switzerland has focused on regulating drones according to their size, hardware such as cameras, and technical capacity such as the ability to fly beyond the visual line of sight of the pilot (Federal Office of Civil Aviation, FOCA, 2024). Such an approach has made no effort to respond to fears around drone swarms, nor to make evident that "blue skies" are protected in a way that the public can accept (Thomas & Granberg, 2023). If the regulatory system, and by extension the operators that fly drones within it, are to be trusted, then the public needs to understand that drones are indeed subject to limits, both currently and in the future. Again, this connects directly to value-sensitive innovation, with its requirement for a "joint and long-term outlook by society that integrates social, economic, and environmental objectives" (Dearing, 2000).

Finally, the tendency of participants to focus on so-called acceptable use cases as an avenue to increasing public acceptance, as opposed to interrogating more deeply the values that make the use cases acceptable, was a key indication that participants were focusing on social acceptance and not on ethical acceptability. Normalization was raised several times as a valid strategy for gradually overcoming resistance. Such a strategy was considered less likely to build trust, however, as it was not transparent regarding its end goal—participants failed to see this, despite their implied statements that trust was important and transparency essential.

At the time of publication, as the use of drones in the war in Ukraine has been ever more prominent, it has become clearer that a short-term focus on acceptable civil use cases will fail to address concerns and associations around the use of drones for surveillance, control, and violence. These applications may even heighten distrust in applications that are ostensibly benign. Again, this points out that the failure to have identified and interrogated underlying values has resulted in policy decisions resulting in a breakdown of trust and thereby a resistance to the technology more broadly.

Values Supporting Trust-Building

Although participants did not draw out the full role that trust plays in acceptance, the concept featured prominently in their discussions around communication, operator, and regulation. Table 3 shows the values that participants felt contributed to the establishment of trust in each of the three

sub-themes. Among others, these included honest and transparent communication, ensuring that the societal values promoted resonate with the public, and working based on evidence.

Table 3. Trust-Building Values Identified in Interviews

Trust-building Value	Example
REGULATION	
Strong regulations	"If you have a strong regulation and … everything is more or less under control, maybe there is less rejection."
Accountability	"Compliance measures must be implemented, and rules must be enforceable."
Assurance of reliability	"That the technology developed to a point where it's predictable and so people are confident in how it's going to behave and what happens if something goes wrong."
Diversity of expert inputs	"If in the context of … drones [experts] would be able somehow to come to joint conclusions subscribed by experts of different fields then these conclusions would have a convincing character for the public."
OPERATOR	
Rule following	"The important thing for drone pilots is to behave correctly."
Shared values	"If you see that it's a company operating the drone and … connected to some values you have, it's different than if you don't know the operator or you don't know what they're doing exactly. They may be more concerned about what's going on there."
Knowledge	"People think that business controls are more experienced. They are technologically better educated than governmental controllers."
COMMUNICATION	
Honesty	"Be honest, what drones can do? … Where are the technology problems? What are the aims to improve the technology, reducing noise, flying in bad weather conditions?"
Transparency	"Finding a way to communicate or … allowing the use [of drones] to be transparent is going to be important whether that's something you can look at immediately or an app you can use to understand what that thing is doing."
Responsiveness	"You want to be sure that, you know, you can talk with people."
Inclusion	"If the Smiths don't know if they have been consulted, then you very quickly get a letter in the mail or from your neighbor complaining about things."
Managing expectations	"There, of course, it's exciting, but it can also be disappointing if it doesn't make progress."
Evidence-based	"Having the data to provide that confidence that these patterns operate in a safe way."

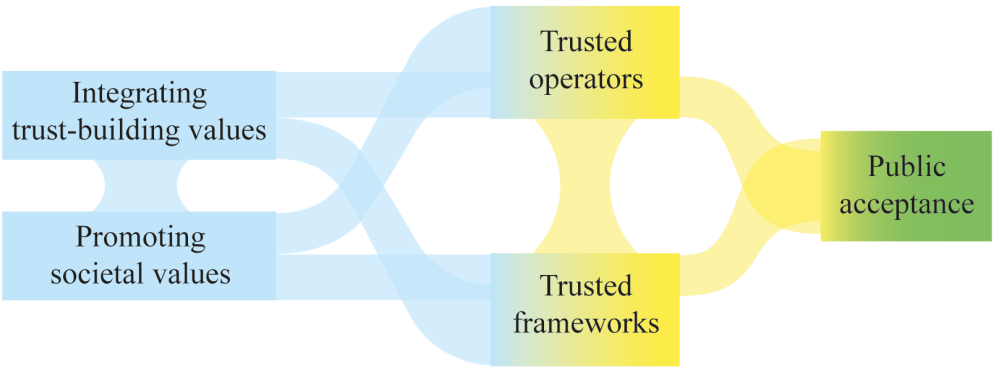
The analysis of underlying values suggested that a framework within which drones operated needed to be trusted by the public—connecting with the public regarding their values, norms, and beliefs. Furthermore, even if different groups of society had different interests, needs, or value systems, it would be, nonetheless, important to discover common ground regarding shared benefits (Taebi, 2017). This implied that such a framework needed to have broad acceptance; in other words, the framework needed to be universally acceptable and, to this end, the values it aimed to promote had to be those accepted as collectively beneficial. One way to achieve this, as noted in the introduction of this article, would be through empirical input regarding how technology impacts people and what values are important to them. A process should, accordingly, be found in which empirical inputs can be leveraged to inform normative conclusions.

One process to be utilized could be that of wide reflective equilibrium (Daniels, 1996; Rawls, 1999). This approach has been frequently used in experimental philosophy as a means of deriving normative conclusions from empirically gathered moral intuitions (Brun 2020; Brun, 2022). The process aims to achieve mutual agreement between moral intuitions, moral judgements, and relevant background theories. When evaluating the ethical acceptability of a technology, moral intuitions gathered through surveys and interviews—such as those underlying the preceding analysis—should be weighed against established moral principles and background theories, such as theories of well-being, autonomy, or identity. The goal is to arrive at well-considered moral judgments about how technology ought to be developed and deployed. Ideally, the process would involve reflecting on a broad range of principles, the arguments supporting them, and relevant background theories. Through this reflection, it would then become evident whether it was necessary to revise either the initial intuitions or the guiding principles and theories.

Given that disruptive technologies, such as drones, have been shown to disrupt a society not only at the social and institutional levels, but also at the conceptual level involving norms, beliefs, and values, adjustments may need to take place to account for intuitions in the context of new technologies (Hopster, 2021). Having gone through this process, the goal will be to arrive at moral judgments regarding how new technologies should be developed and deployed in society—judgments to promote societal well-being from the perspectives of diverse groups, based on a combination of empirical insights and ethical principles. This process must be guided by the need to build public trust which, in turn, would require transparency, inclusion of diverse viewpoints, and opportunities for feedback.

From this perspective, this study supports the need for a wider range of expert input into conversations around establishing such a framework, including government officials, policy makers, operators, and social scientists such as ethicists, psychologists, and anthropologists. Finding ways to reach evidence-based agreement amongst a wide scope of experts will give much greater credence to the limits placed on drone use; it will also encourage operator buy-in, which is crucial if the framework is to garner public trust. In addition, it will ensure a responsiveness to public concerns by considering impacts in a wider societal context. Based on clear and widely accepted limits, this would make enforcement easier. Figure 3 provides an overview of how organizations, the frameworks within which they operate, important societal values, and trust-building values have interacted to promote public acceptance. More work could be done by organizations and others in the field to better understand what the public needs to be reassured about use of disruptive technology, and how this can be provided.

Figure 3. Overview of Interactions Between Values and Acceptance



Mapping public attitudes to identify obstacles to navigate around, rather than to understand which values are at stake, may have reflected the fact that what was currently lacking was an operational framework for understanding and reasoning regarding values. Without tools for measuring values, experts have reverted to proxies such as societal acceptance, which are easier to measure, report, and act on. The challenge, thus, may not have been a lack of concern about values, but a lack of structured methods for engaging with them. In a subsequent study, the author will set out a methodology for exploring such a process of wide reflective equilibrium—one which can engage stakeholders in ways that promote public trust and arrive at normative ethical conclusions to inform a framework for the development and integration of new technologies into society.

LIMITATIONS

As with any thematic analysis, the results of this study were susceptible to subjective interpretation. The main potential weakness lay in how to carry out a meaningful and data-driven analysis of the participants' interviews. This was particularly the case given that the coding and analysis was undertaken mostly by one researcher.

The data was read in the light of a specific research focus regarding the intersection between societal acceptance of disruptive technology, value-based innovation, and urban sustainability—the final interpretation reflected these aspects. While efforts were made to ensure that the process of developing themes did not overly reduce the complexities and interconnections between the data, the nature of thematic analysis risked obscuring connections between themes. Nonetheless, the analysis provided a jumping-off point for further research.

Experts were recruited from their participation in a previous survey study in which they were asked about acceptance of urban drones. Consequently, they did not come to these semi-structured interviews with objectively but were already primed by the previous context. Additionally, the fact that they had a working relationship with the involved researchers may, to some degree, have

influenced the honesty with which they addressed the issues. For example, there may have been a tendency for the experts to portray themselves in a "better" light. In addition, some interviews were conducted in Swiss German, potentially losing nuances in the English translation.

Finally, it must be kept in mind that this was a study undertaken in Switzerland for the purpose of assessing expert perceptions of public attitudes toward urban drone use in the Swiss context. While the notion of trust as a fundamental value in public acceptance of drones may possibly be universally applicable, it is likely that there are differences in the trust-building values and more broader societal values in different countries and cultures (United Postal Service Office of Inspector General, 2016).

CONCLUSION

This study generated a model for studying acceptance of emerging technology that placed trust at the center of societal acceptance. Values played an important role in this context, particularly in shaping trust that specific use cases would genuinely support or reflect those values. Sustainability was shown to be a key value, fundamental both in addressing public fears around drones and in establishing trust in innovations, organizations, and regulations—this was, however, mostly overlooked by participants. Societal acceptance depended on a complex interaction between operators and their regulatory framework, through establishing trust and promoting important values on the part of both operators and regulators. A weakness, in this regard, was that one part of the system could affect other parts of the system; for example, an operator that did not promote societal values with its drone use, but merely annoyed the public and undermined trust in the regulatory framework that permitted the operation. This study suggests new pathways for operators, regulators, scholars and other stakeholders to explore public acceptance, and shed a different light on why some use cases have been highly accepted, while others have been rejected.

The analysis revealed a gap between theoretical frameworks of acceptance and how—as a complex concept—acceptance has been understood by experts, highlighting the need for a more effective operational framework for interpreting and reasoning regarding values. Without such a framework, those responsible for developing and integrating emerging technology into society are arguably more likely to slide toward an understanding of acceptance as tolerance and lose sight of how to achieve the active component of acceptance. This finding has implications for emerging technology across the board, and it is hoped that the framework sketched herein will provide the basis for developing a concrete methodology that can be deployed for other emerging technologies beyond drones.

Given the insights on how parts of the drone community impact on others, it is critical that the wide range of experts identified in this study continue to be engaged in the work. This will involve taking the widest view possible of the drone ecosystem and reaching out to those relevant experts who have not currently been part of the conversations, such as ethicists. The focus of future engagement should be on how to ensure that the framework within which drones operate is trusted by the public and confers trust on operators working within it, while keeping in mind that trust is multi-faceted and, at any one point in the system, there may be many individuals, organizations, or institutions influencing that trust. Rather than only looking at the technical aspects of drone use, a more effective approach requires a holistic overview of the entire ecosystem—this can then build a broad base of trust, one that responds to public concerns, aims to promote societal values, and is responsive and sustainable from a systems thinking perspective.

DATA AVAILABILITY STATEMENT

The author confirms that the data supporting the findings of this study are available within the article.

COMPETING INTERESTS STATEMENT

The authors of this publication declares there are no competing interests.

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