

Drone Programs in Tennessee Public Safety Agencies

A Status Report

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Executive Summary

Drone technology has been an increasingly important tool for law enforcement agencies. With more drone programs being established in Tennessee, this study provides the first state-wide snapshot of drone adoption, motivations and challenges, operation and policy guidance as well as community engagement and effectiveness assessment among public safety agencies. Drone programs accelerated after 2015, and approximately two thirds of responding departments either currently have drone programs or plan to establish them within the next two years. Larger agencies serving more population are more likely to have drone programs, suggesting that drone adoption is driven primarily by public safety needs and organizational resources. Most departments began with one or two drones and expanded their fleets in response to safety needs. Many agencies have invested in both technical and organizational capacities such as certified pilots and FAA certificates.

The main motives for drone programs were public safety needs, with the most common operational uses in search and rescue, disaster and emergency response, and large crowd or event monitoring. In the meantime, drone programs have been challenged by limited funding, insufficient personnel and training, and operational costs. Most operational drones are equipped with cameras, thermal imaging, and obstacle avoidance systems, yet, integrating drones with other law enforcement technology remains very limited. Many departments have established written policies and guidelines to govern drone operations, with great attention to operational procedures, accident reporting, crime investigation, privacy, and data management. However, a substantial number of agencies still lack formal written policies, suggesting that continued policy development is needed as drone programs mature.

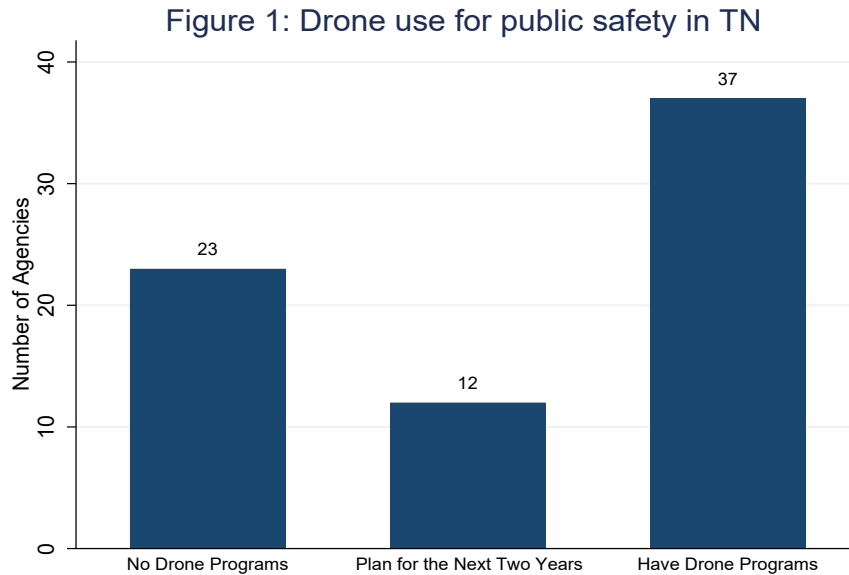
Departments report high levels of satisfaction with their drone programs, indicating increased situation awareness, better operational results, and improved public safety. Community engagement is critical to long-term success of drone programs. Drones have been deployed to engage with local communities, often in educational programs, safety demonstrations, and other policing initiatives. Some departments actively embrace community engagement practices, ranging from prior approval, public notice, community input, to data collection and access policy. Nevertheless, there is a wide variation in the perceived effectiveness of these efforts. While drone programs have demonstrated operational benefits, continued efforts are warranted to engage in drone programs with local

communities. Community engagement will be essential to the long-term success of drone programs in Tennessee public safety agencies.

Drone programs in Tennessee public safety agencies

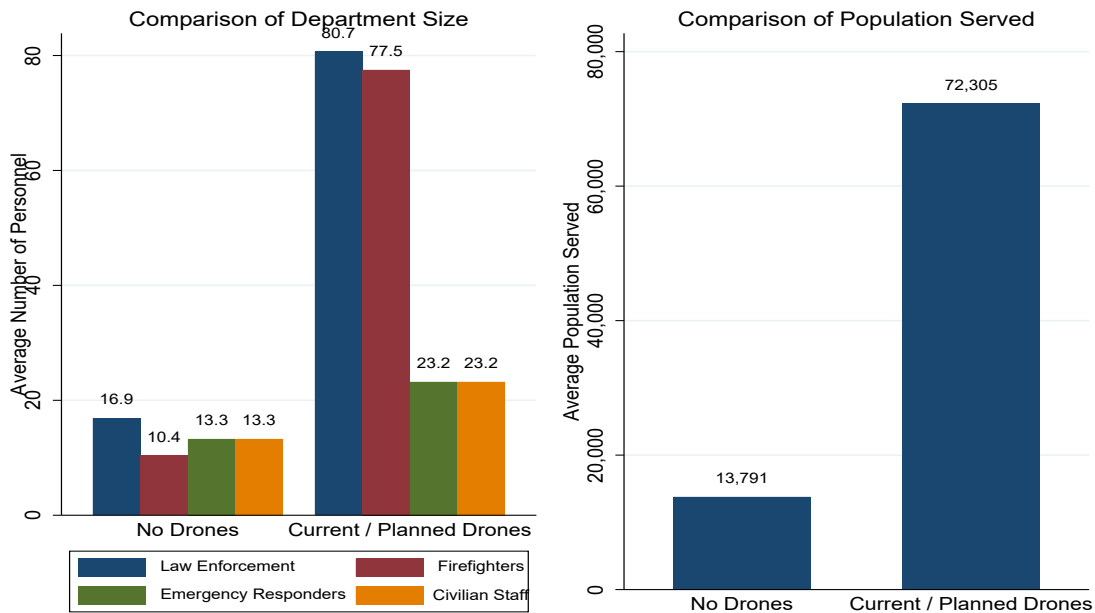
Drone use is a relatively new phenomenon in law enforcement agencies in the United States. By 2020, more than 1500 state and local law enforcement agencies were reported to have drones (Congressional Research Service, 2023). Research has argued that drone use can enhance situational assessment, improve officer safety, reduce response time and strengthen crime prevention, among many other benefits (Engberts & Gillissen, 2016). In the meantime, civil rights organizations and citizens raised concerns over routine surveillance, privacy, and pervasive monitoring (Barrows, 2021; Ljungholm, 2019; Thantilage et al., 2025). As an emerging public safety technology, the adoption of drones has been uneven (Lucas & Burgett, 2025). This raised an important question: Which law enforcement agencies are adopting drones, and what are their profiles?

Focused on public safety agencies in Tennessee, including law enforcement, firefighting and emergency management departments, this study presents the first statewide survey of drone adoption and use. Among 73 responses (Figure 1), 37 departments currently operate drone programs, while 12 reported a plan to establish drone programs in the next one or two years. Together, these agencies account for two thirds of all respondents. The remaining 23 departments indicated no drones in use, nor a plan to establish a drone program soon.

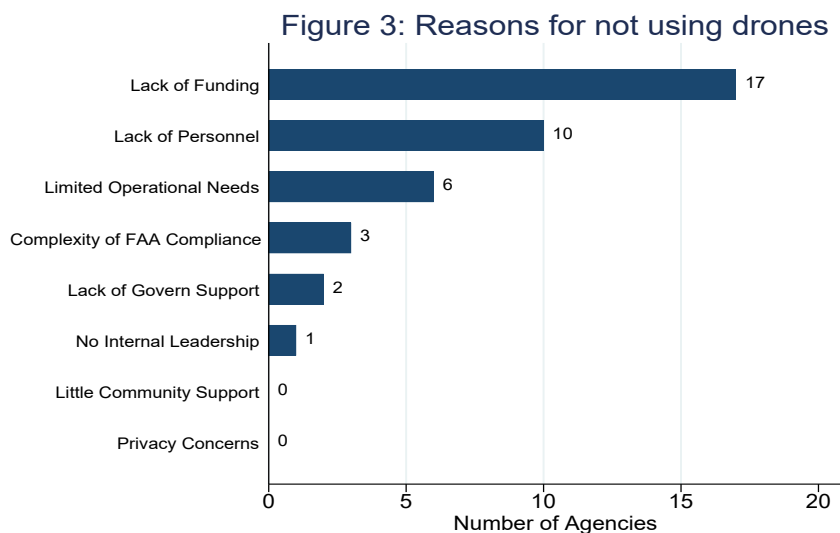


Implementing a drone program requires substantial investment in both equipment and personnel. Therefore, it is reasonable to expect that departments with drones are likely different than those without drones. Departments serving larger populations may have greater public safety demands that justify the adoption of drone programs, while departments with more staff members are likely to possess more personnel and organizational capabilities to implement drone programs. Figure 2 demonstrates that the differences between departments with drone programs (including those planning to have drones) and those without are substantial. On average, departments with current or planned drone programs employ 80 full-time law enforcement officers, 76 firefighters, 23 emergency responders, and 23 civil staff members. In comparison, departments without drones employed only 16 law enforcement officers, and approximately 6 firefighters, emergency responders and civilian staff members respectively. Similar differences are observed in the populations these departments serve. Departments with drones serve an average population of 70,000 citizens, whereas departments without drones serve an average of only 13,000 residents. The findings suggest that drone adoption is associated with agency size, and service demands, and that larger departments serving more populations are more likely to have drone programs to meet increasing public safety needs.

Figure 2. Comparison of Departments With and Without Drone Programs

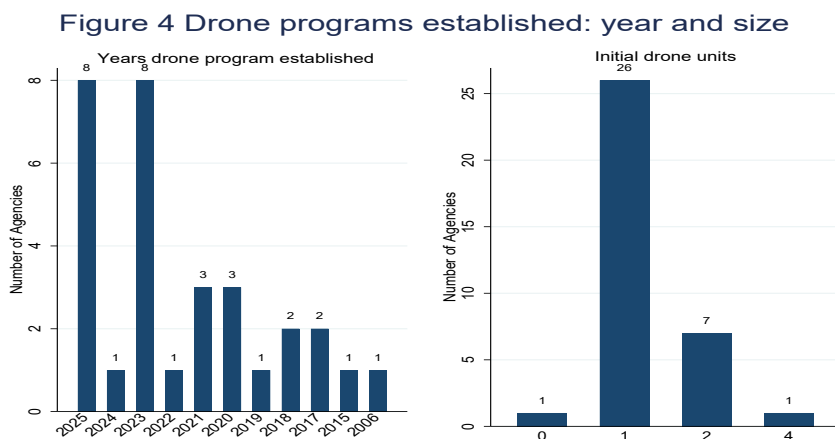


The survey asked departments who had not adopted drones to identify potential reasons. Figure 3 provides the results. Lack of funding is the most cited reason, reported by 17 departments, followed by a lack of personnel reported by 10 departments. The findings indicate that financial and personnel constraints are the primary obstacles to drone adoption. Some departments reported limited operational needs, likely due to departments only serving limited populations or geographic areas. Three departments identified FAA compliance requirements as a barrier. Two departments cited lack of government support for drone programs, and one reported no internal leadership. No departments identified either community support or privacy concerns as barriers against drone programs. This survey was administered primarily to department chiefs and agency leaders who have substantial influence over decisions regarding drone programs. The findings suggest that drone adoption is driven largely by public safety needs and organizational resources, whereas community involvement or privacy protection may not be primary considerations.



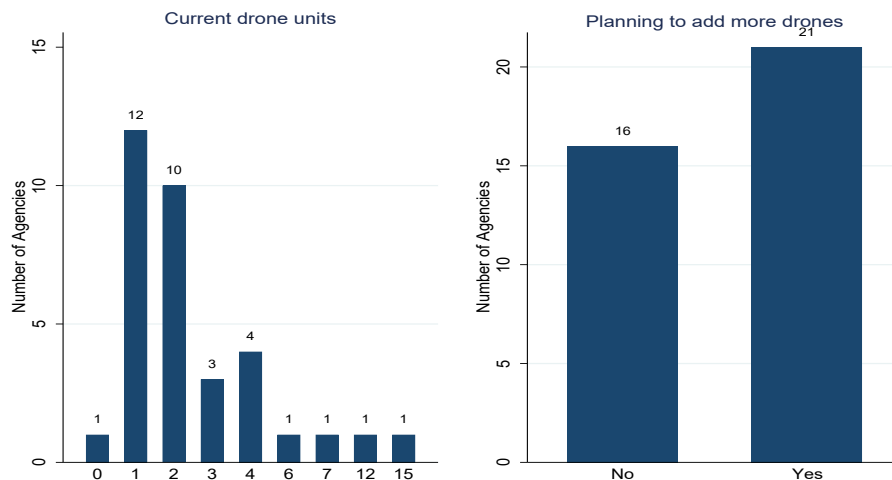
Drone programs: growth and capacities

To develop a more comprehensive understanding of drone programs in Tennessee, departments were asked when their drone programs were established, how many drones they initially had acquired, and how many drone units they currently operate and their future acquisition plans. Figure 4 tracks the growth of drone programs over time. The earliest drone program was established in 2006, while more popular adoption of drone programs was not seen until 2015. Adoption accelerated recently as eight departments reported the establishment of drone programs in both 2023 and 2025. Most departments started with one drone, as reported by twenty-six respondents. Seven departments started with two and one started with four units, suggesting that most departments initially adopted drones on a very limited scale before expanding drone programs over time.



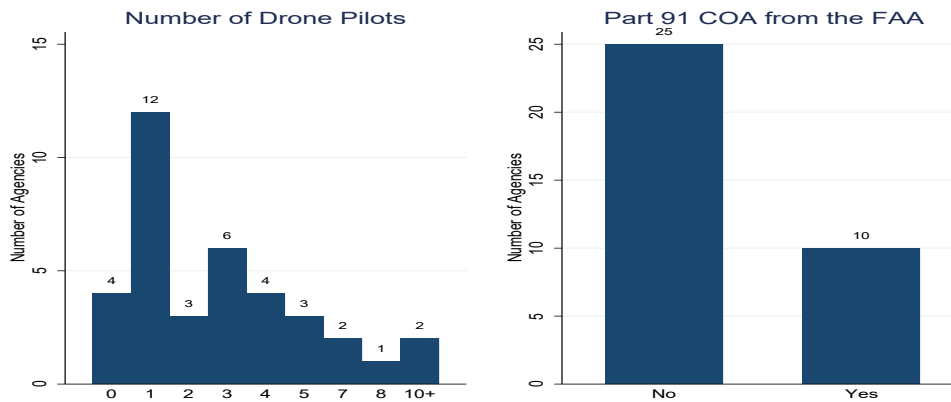
The expansion of drone programs has been substantial (Figure 5). One department reported operating fifteen units, while another reported 12 drones. Most departments continue to maintain small fleets. Twelve departments reported operating only one drone, and ten departments reported two drones. There are a few departments with three or four drones. Despite modest fleet sizes, twenty-one departments indicated they plan to add more drones in the future, reflecting continued investment and commitment to drone technology.

Figure 5 Growth of drone programs in Tennessee



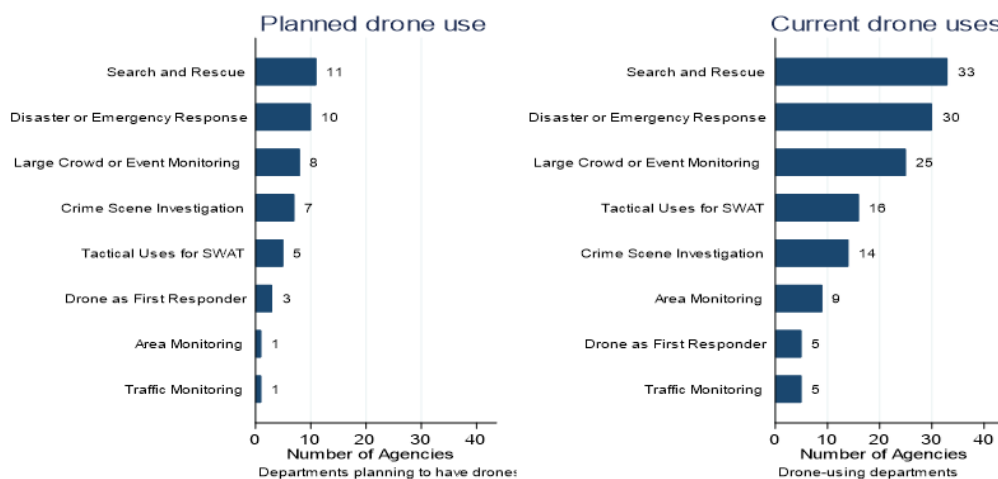
Adding more drones is not just about financial investment but requires adequate personnel and organizational capacities (Figure 6). On average, responding departments reported having four FAA Part 107- certified remote pilots. Only two metropolitan agencies reported more than 10 certified drone pilots, with 21 and 39 pilots respectively. Approximately one third of the responding departments (12) reported having only one pilot, while four departments reported having drones without certified pilots. In addition, 25 departments reported holding a FAA Certificate of Waiver or Authorization (COA). Agencies with COA are authorized to conduct certain drone operations under FAA-approved procedures and may develop internal training programs for their personnel. Overall, many departments have already developed strong organizational capacities to expand their drone programs.

Figure 6 Departmental capacities for more drones



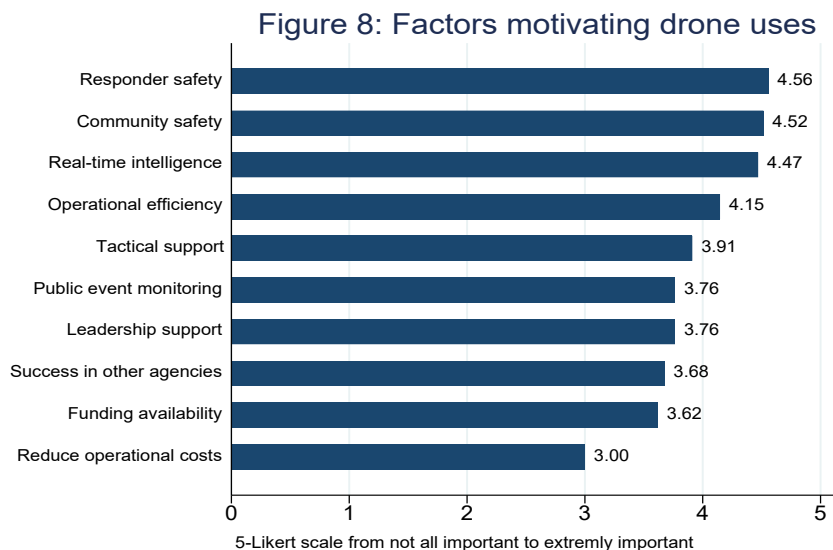
What do departments use drones for? The departments who planned to have drone programs within the next one or two years were asked about their planned uses of drones, while agencies with existing drone programs were asked about their current operational use. Figure 7 compared these planned and actual uses for drone programs. The results show that there is a high level of consistency across two types of departments. Drones are primarily used for search and rescue, disaster or emergency response, and large crowd or event monitoring, in descending ranking order. A modest number of departments either planned to use or currently used drones for SWAT and criminal scene investigation. Fewer departments intended to use drones as first responders, for area monitoring or for traffic monitoring.

Figure 7 Drone uses: planned vs. practice

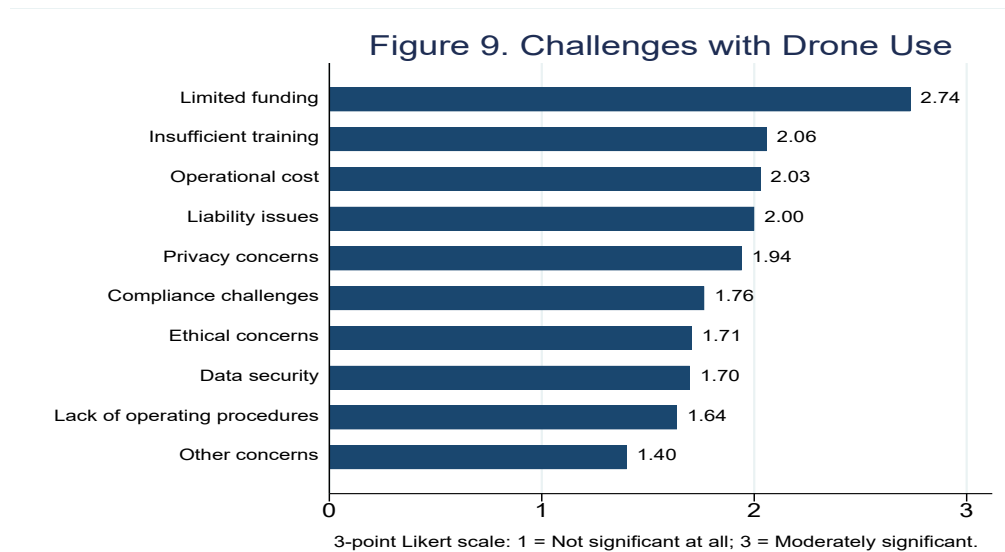


Motives and challenges for drone programs

Drone programs require substantial financial investment, leadership support, and technical resources. To better understand what motivates agencies to adopt drones, the survey asked respondents to rate the importance of various factors in their decision to implement drone programs. The three most important factors are responder safety, community safety, and access to real-time intelligence. Operational efficiency, technical support, and event monitoring were also identified as important considerations. By comparison, leadership support, funding availability, and cost reduction were less influential. Further analyses show that motivations can be grouped into two broad categories: (1) safety-related needs and (2) organizational and external support factors. Overall, agencies adopt drones primarily to enhance operational effectiveness and improve responder and community safety. In the meantime, successful drone programs depend on leadership and community support.

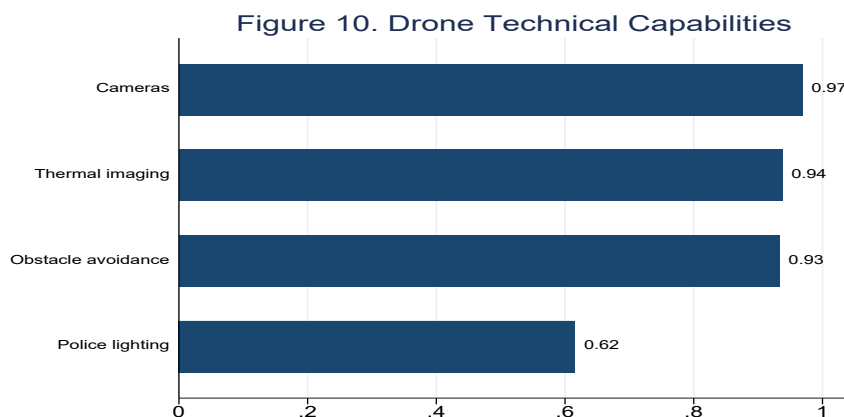


When respondents were asked about the potential challenges with implementing drone programs, a different picture emerged (Figure 9). The most frequently cited challenges were funding availability and personnel training, which complemented the earlier finding that establishing a drone program requires substantial financial investment and committed personnel resources. Although departments view drones as effective instruments for improving public safety and operational effectiveness, resource constraints and personnel training continue to present major obstacles.



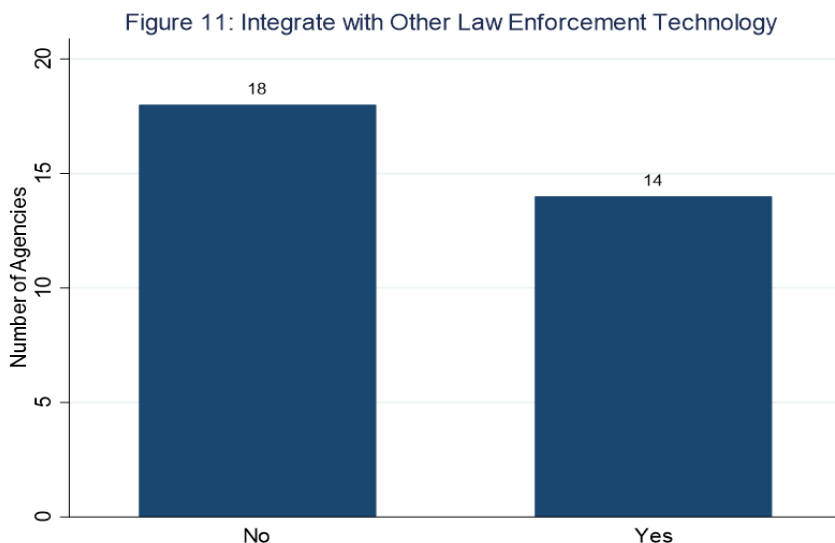
Technical capacities and drone policies

Not all drones are equipped with the same technical capabilities. In addition, law enforcement agencies adopt different policies regarding drone deployment and operations. Figure 10 illustrates the range of technologies on drones that are currently in use by law enforcement agencies. Nearly all drones (96%) have been equipped with cameras and 92% with both thermal imaging and obstacle avoidance capabilities. Police lighting was available on 57% of drones. None of the responding agencies reported their drones with parachutes. In addition, five departments indicated that their drones have speaker systems, and one department reported the use of real-time kinematic (RTK) positioning techniques.



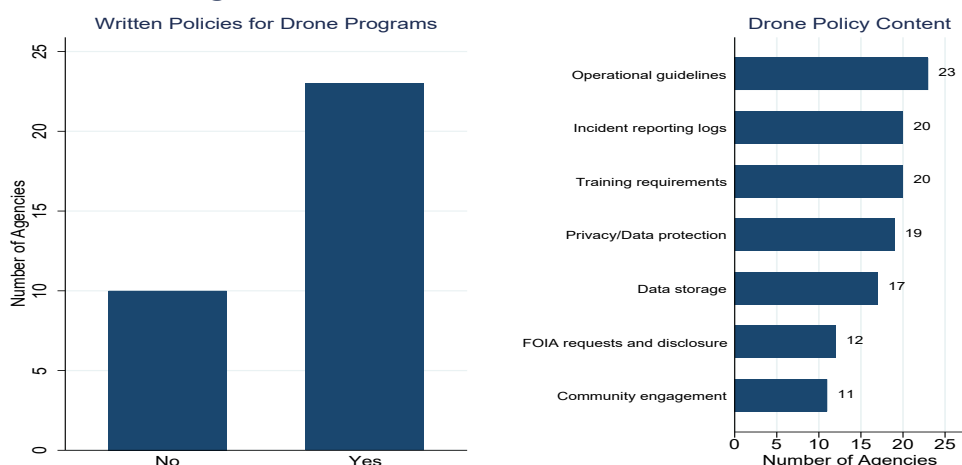
Departments were asked further whether their drone units are integrated with other law enforcement technologies, such as Real-Time Crime Centers (RTCCs) or city camera networks. Approximately

two-thirds of respondents provided answers, of which 40% reported integrating drones with other law enforcement technologies. Studies contend that drone integration most commonly occurs with RTCCs, thermal imaging system, and GIS mapping to enhance situational awareness and operational effectiveness (Police Executive Research Forum, 2020). More in-depth integration is likely between drones and Automated License Plate Readers (ALPR) and body-camera systems, while integration with AI-enabled visual analytics and cross-platform systems remains less popular (Police Executive Research Forum, 2020). Consistent with the literature, more than half of the responding departments indicated that their drone programs have not been integrated with other law enforcement technologies. Among those integrated departments, most reported only basic or conventional forms of integration, suggesting considerable opportunities to expand more advanced technological capabilities for their drone programs.



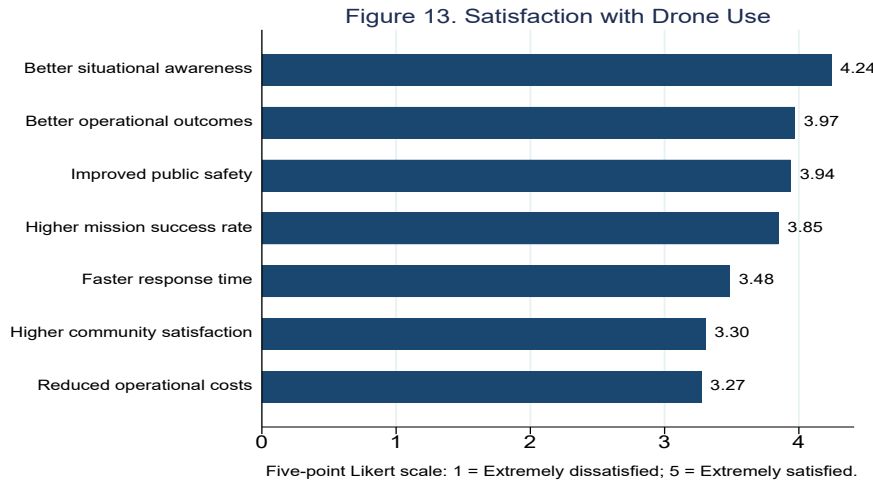
Departmental policies and guidelines matter. Approximately two thirds of responding departments reported having written policies and guidelines to govern their drone operations. Given the layered regulatory frameworks established by FAA as well as applicable state and local legislation, it is essential that departments set up operational requirements, stipulate use conditions and address legal, ethical and privacy concerns. Without clear departmental policies, drone operations may face public criticism and community resistance. Figure 12 illustrates both the presence (or lack thereof) of department policies and outlines the areas most addressed. As can be seen, the most covered areas span from operational guidelines, incident reporting and documentation, crime scene investigation, to privacy protection and data management. A small fraction of departments extent their attention to FOIA requests and community engagement.

Figure 12. Drone Policies and Content

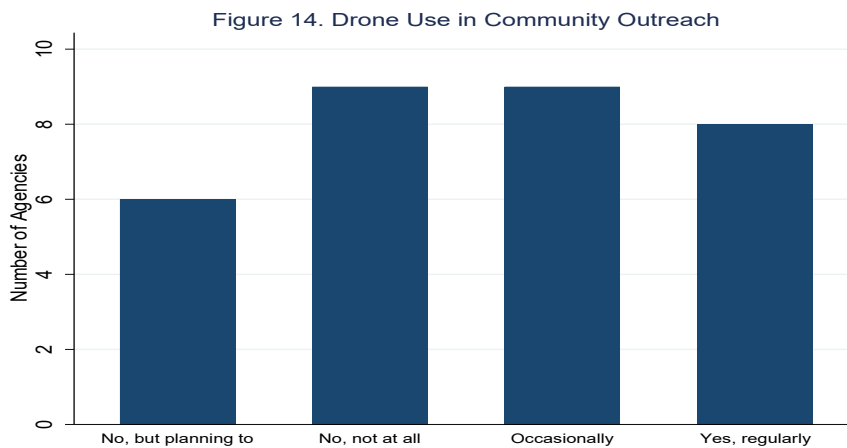


Satisfaction and community engagement

With an increasing number of drone programs being implemented, it is important to evaluate how effective these drone programs are performing. Departments were asked to reflect on their drone operations over the prior six months and assess their level of satisfaction across several performance dimensions. Figure 13 presents an overwhelmingly positive assessment of drone use in law enforcement. Respondents reported high levels of satisfaction with drones' ability to increase situational awareness, improve operational outcomes, and enhance public safety. Agencies perceived drone operations as essential to public safety. Departments also expressed high levels of satisfaction on drone's contribution to higher mission success rates, faster response time, higher communication satisfaction and lower operational costs. No responding department reported a neutral or negative overall assessment of their drone programs.

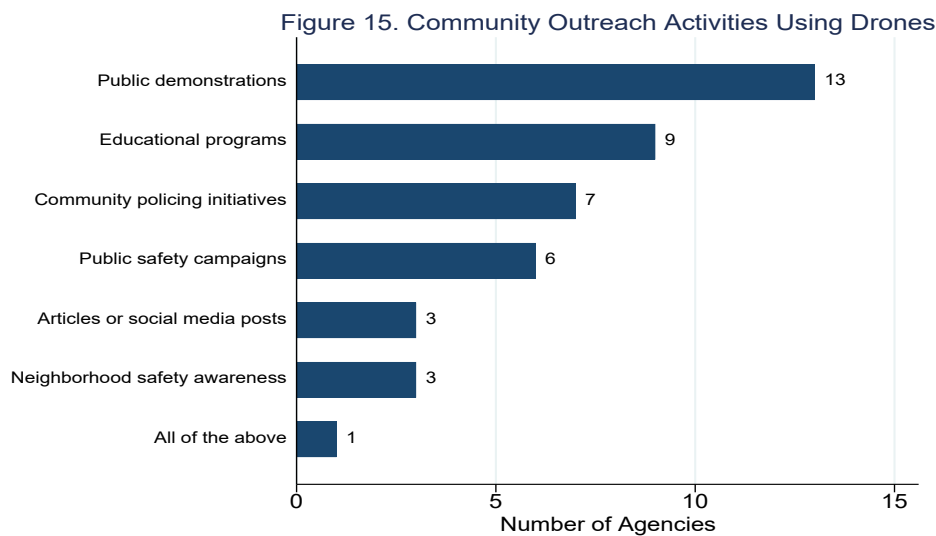


Community engagement is critical to successful implementation of drone programs. Law enforcement agencies need to educate and interact with local communities to build public trust and promote transparency for their drone operations. Respondents were asked whether their departments had used drones in community outreach activities in the prior six months. Figure 14 presents the results. Approximately one quarter of responding departments had not used drones for community outreach, while a small proportion indicated their plan to do so in the future. Half of responding departments had either used drones occasionally or regularly for community outreach activities.

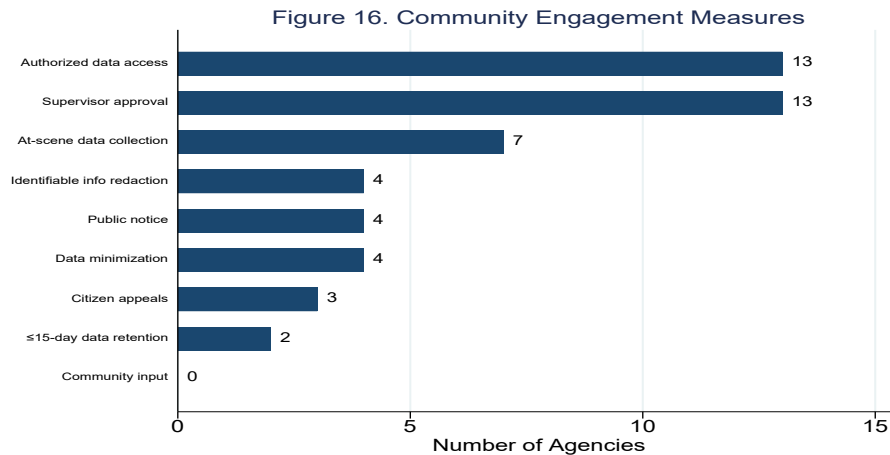


What community outreach activities have drones been used for? Among responding departments, thirteen had used drones for public demonstrations, and nine departments engaged in educational programs, making both the most frequently cited outreach activities. These were followed by community policing initiatives, and public safety campaigns. Three departments reported publishing articles or social media posts about their drone programs, and an equal number of departments used drones to support neighborhood safety awareness. One department reported that it used drones for all

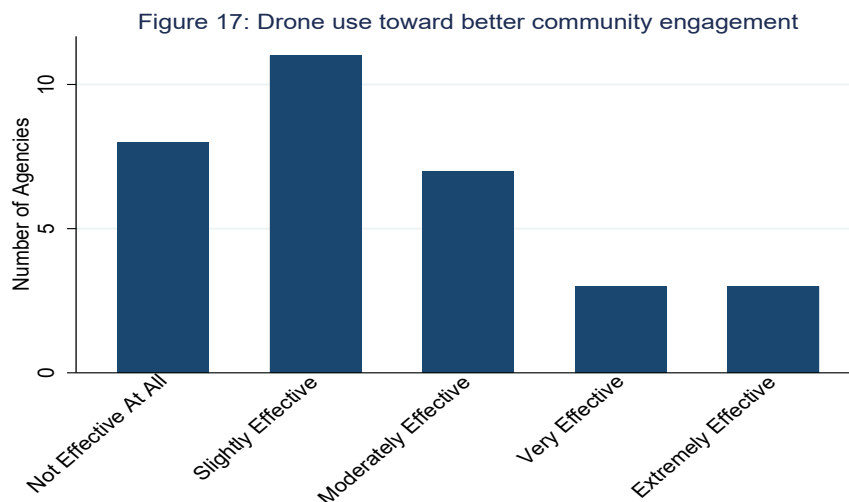
the listed community outreach activities. Given that only about half of responding departments engaged in any community outreach activities with drones and that relatively few agencies participated in a broad range of activities, there seems to be considerable opportunities to expand drone use for communities.



Departments were also asked about their community engagement measures. The survey presented a list of recommended practices, most of which are intended to address potential community concerns with drone use and promote transparency and accountability. Figure 16 illustrates the extent to which responding departments have implemented these measures. Thirteen departments constrained data access to only authorized personnels, and an equal number of responding departments required supervisor or legal approval before drone flights. Seven departments limited data collection to “at scene” only. Four departments redacted identifiable information, published police notices, and adopted data minimization techniques respectively. Three departments allowed citizens to remove data or appeal for drone data use. Two departments adopted policies retaining drone data use for no more than 15 days. Yet, no responding departments reported adopting community input in developing their operational policy for drone programs.



It is possible that some departments did not use drones for community engagement because they did not perceive drones to be effective for that purpose. To obtain a more comprehensive understanding, departments were asked a broader question: how effective has drone use been in improving community engagement or public perceptions in the past six months? Figure 18 presents the results. The responses provided a more nuanced assessment of drone's role in community engagement. Eight departments responded that drone use was not effective at all in improving community engagement while eleven departments perceived drones to be slightly effective. Another seven departments rated drones as moderately effective. Only three departments considered drone usage to be very effective, and another three rated it extremely effective in improving community engagement and public perceptions. Compared with the number of departments who reported specific community outreach activities, the responses here presented a broader range of law enforcement agencies' perceptions of the effectiveness of drones in fostering community engagement.



Although departments reported high levels of satisfaction with their drone programs, they also recognized that community engagement remains to be a significant challenge. While some departments viewed drones as having limited effectiveness on community engagement, others had been actively engaged in different outreach activities and adopted a wide variety of community engagement measures. The findings point to substantial variation across departments in how effective drone programs can be to engage local communities. As drone technologies become more advanced and more integrated with other technologies, community trust and support will be essential to the long-term success of drone programs as well as law enforcement agencies. More efforts are warranted by law enforcement agencies to actively engage local communities and to serve public safety needs while also addressing community expectations and concerns.

Conclusions

Drone programs have proliferated in public safety. Tennessee public safety agencies generally mirror national trends toward increasing drone adoption. In 2020, a national survey (Police Executive Research Forum, 2020) reported that 47% of responding agencies already had established drone programs and another 34% planned for adoption soon, accounting for 81% of respondents embracing drone programs. The Verizon Frontline 2025 Public Safety Communications Survey (Verizon Frontline, 2025) reported that drone adoption and usage is expected to triple in public safety within next five years and 48% of responding agencies expect to use drones or robots on a daily basis within the same time frame. In comparison, approximately two-thirds of Tennessee public safety agencies reported adoption of drone programs, suggesting that there is substantial room for additional expansion over time.

Consistent with the reports and operational reviews (Ray et al., 2022), Tennessee public safety agencies have deployed drones primarily for search and rescue, disaster response, large public events and crime investigations, among others. They also mirror a national trajectory that most public safety agencies begin with one or two drones and expand drone programs incrementally over time. The main motivations for drone adoption are to provide more safety for both officers and local communities and to improve operational effectiveness. The challenges are mainly resource constraints ranging from limited funding, insufficient training to operational cost, and compliance requirements. Limited attention is also placed on data security, privacy and ethical concerns, and other legal and policy issues.

It should be noted that this survey was administered to agency chiefs and department heads; the findings thus should be interpreted as reflecting their perceptions.

It is commendable that two thirds of Tennessee public safety agencies have written policies and guidelines governing their drone programs. A written policy is the first step to develop standards of operational procedures and to assess potential risks and effectiveness. Current policy content is primarily focused on operational guidelines, incident reporting and training requirements, with limited attention on privacy, data management, and community engagement. Given the complexity of regulatory frameworks, policies for drone programs need to incorporate compliance requirements from FAA and state legislations but also must commit to engage with local communities and promote transparency, safety and accountability. Future efforts are warranted to ensure that policies and guidelines need to strike a delicate balance between public safety operations, constitutional protection, and community expectations.

Most agencies have not integrated their drone programs with other law enforcement technologies such as RTCCs, body-camera, ALPR, or robots. With more advanced technologies available, drones can be strong force multipliers in public safety, but that is not to happen in isolation. Currently, only a few agencies report on basic or conventional forms of integration with their drone programs. Though drones are well-equipped technically, strategic planning is needed to make drones more a part of safety technology networks. Considerable opportunities are present to expand more advanced technological capabilities for their drone programs.

The long-term success of drone programs can hardly be possible without community engagement. Existing literature contends that community perceptions can make or break drone programs (Hardy et al., 2022; Truog et al., 2020) and that public safety agencies need to have community engagement plans to balance safety, privacy and community consent, particularly so in vulnerable communities (Chavis, 2021). The FAA (2016) has developed Community Involvement Manual to reaffirm their commitment to giving the public and local communities opportunities to be informed, become involved and have their interests and views considered. According to a national survey, most Americans (54%) are concerned that police drones may invade their privacy (Ekins, 2017). Within Tennessee public safety agencies, approximately half of departments use drones in community outreach, and one quarter had no engagement at all. Public demonstrations and educational programs are two most cited community outreach activities that drone programs have been engaged with. Some

attention has been paid to adopting community engagement measures, ranging from at-scene data collection, reduction of identifiable information, to citizen access and appeal rights for drone footage, and data retention period. Overall, responding departments reported that their drone programs have very limited engagement with local communities. Approximately one quarter of agency leaders perceived drone usage to be “not effective at all” toward community engagement and very few rates “very effective” or “extremely effective”. The findings suggest that departmental outreach endeavors involving drone programs have been struggling, either due to limited activities, or negative perceptions of their effectiveness. Much work needs to be done on designing effective engagement plans and activities with local communities.

Drone programs in Tennessee public safety agencies have made substantial progress over the past decade. Departments have expanded their drone programs, developed their personnel and organizational capacities, and increasingly incorporated drones into public safety operations. Agency leaders reported consistently high levels of satisfaction with their drone programs. In the meantime, considerable opportunities remain to further expand drone programs, strengthen drone integration, and refine departmental policies. Equally importantly, agencies should continue to strengthen their community engagement efforts. Current outreach efforts and community engagement measures remain uneven across departments, and many agencies reported only modest effectiveness in engaging with communities. As drone programs continue to develop, it is critical to have sustainable investment in community engagement, accountability and public trust to ensure that drone programs serve both public safety demands and community interests. ‘

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