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# Drones in Everyday Life: A SWOT Analysis of Social Perception in Hungary

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# Abstract

As Unmanned Aerial Systems (UAS) or drones become more and more integrated into our everyday life, understanding social perception is crucial for the technological introduction, adoption and development of drones. In this thesis we researched ways to analyse the social perceptions of drones in Hungary. The focus of the literature review was to identify frequently measured or discussed questions to be the base for our questionnaire and hypotheses. We found that utilizing the SWOT analysis method, which is usually used for strategic planning, we can average positive and negative attitudes and create 2 new metrics: SO_attitude (positive) from the strengths (S) and opportunities (O), WT_attitude (negative) from the weaknesses (W) and threats (T). To measure the attitude, a quantitative questionnaire is made which contains 16 questions (4 questions for each of the 4 SWOT quadrants, from which 8 is positive attitude and 8 negative attitude) to measure attitude on a 5 level Likert scale. The quantitative analysis of the participants responses of the questionnaire rejected three of the four null hypotheses. The results confirmed a statistically significant positive relation between knowledge and attitude (H1, $p = 0.031$). No significant correlation was found between gender and privacy concerns (H2, $p = 0.158$). Surprisingly, the urban population has a statistically significantly higher negative attitude (WT_attitude) towards drones (H3, $p = 0.002$) than their rural counterparts. Finally, we were able to confirm the statistically significant inverse correlation between the positive attitude and noise (H4, $p < 0.001$, $r = -0.208$) of a drone. The findings of this survey are expected to facilitate the development of strategies to increase the positive perception of Hungarian society.



## Keywords

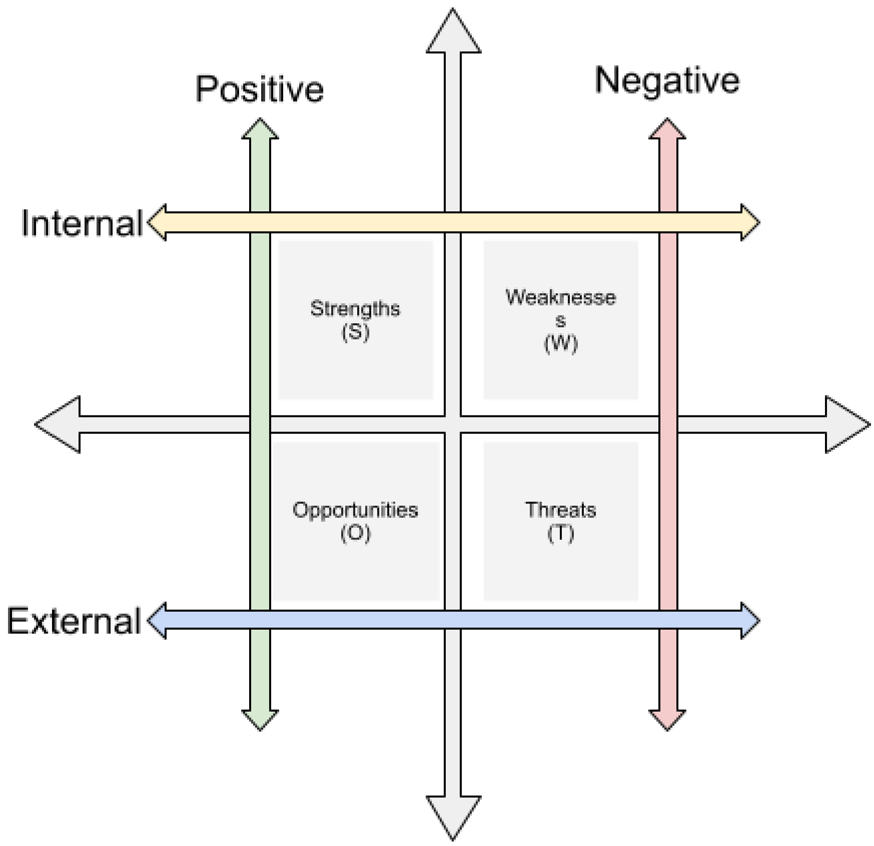
1. Drones
2. Unmanned aerial systems
3. Social perception
4. Hungary

# Introduction

## Mea culpa maxima

I often receive feedback from colleagues in the field of drone technologies, from hobbyists to operators, that the proper terminology is “Unmanned Aerial System” or “Unmanned Aircraft System” (UAS[3]). However, even journalists admit face to face, that the terminology “drone” is used by them as this is the accepted term by the general public.

## SWOT analysis




## Likert scale

1. 1 = Strongly disagree
2. 2 = Rather disagree
3. 3 = Neutral
4. 4 = Rather agree
5. 5 = Strongly agree

[3] https://en.wikipedia.org/wiki/Unmanned_aerial_vehicle 2025-11-26

# Methodology

Talking with colleagues and fellow researchers, the question seems to arise with increasing frequency: How does Hungarian society perceive drones in our everyday life? We decided that this question requires a definite answer in order to plan future solutions and be able to have a more educated discussion for future topics. For example: Should building codes for public institutions mandate Automated External Defibrillators (AEDs[4]) in their first aid stations or the social attitude will be open towards a delivered-by-drone solution. After a quick study in scientific databases we were not able to find any available and comprehensive research to have a confident answer for our question. Hence the idea for this thesis was outlined.

We did literature review in the field of sociology and drone technology in order to identify existing researches which discussed existing practices, questions, concerns and possibilities regarding social attitude towards drones. During literature review, one of my personal observation was that the majority of research in sociology deals with attitudes towards combat and military drones. This part of our research confirmed that work has to be done in order to answer the thesis originating question. During literature review we registered questions that other papers have examined.

Once we identified the most frequent and popular topics we have chosen 4 of them as our hypotheses: Knowledge of drones and positive attitude (H1), female perception of drones and privacy (H2), rural society perception compared to urban society perception (H3), correlation between noise pollution and utility of drones (H4).

After identifying the base concepts for the hypotheses of this thesis we started discussions on the topic on how to measure social acceptance. To solve this part, we utilised the Likert scale[5] as this is a psychometric scale used in research questionnaires. We debated on if our scale should measure from negative to positive interval, but this approach seemed complex to have a simple statistical analysis done on its results. We identified a possible, but unconventional, approach with the use of a SWOT analysis[6]. The SWOT analysis method is most often used to evaluate positive and negative factors affecting an organization and with another dimension we can even split our analysis into 2 additional factors, making the possible research categories into 4 quadrants: Internal positive factors as strengths (S), internal negatíve factors as weaknesses (W), external positive factors as opportunities (O) and finally, external negative factors as threats (T). With these 2 dimensions (2 axis) our measurements can cover a range of positive-negative and internal-external. We identified and chose 16 questions from our literature review in order to populate our SWOT analysis matrix, 4 questions into each SWOT analysis quadrant.

In order to collect primer data points for our research, we incorporated the 16 selected questions into a web based form and published it under an url. As we were not able to identify a clear group who can represent the Hungarian society, we decided rely on the Law of Large Numbers[7] in our sampling design. Obviously, we were prepared to check and explain the demographic properties of the questionnaire participants.

In order to be able to compute significance from the study, we designed a positive (SO_Attitude) and a negative (WT_Attitude) metric to measure the respective attitudes. For the H1, H2, and H3 hypotheses a Students's *t*-test[8] was used for determining a statistical significance. For the H4

[4] https://en.wikipedia.org/wiki/Automated_external_defibrillator 2025-12-04
[5] https://en.wikipedia.org/wiki/Likert_scale 2025-12-04
[6] https://en.wikipedia.org/wiki/SWOT_analysis 2025-11-26
[7] https://en.wikipedia.org/wiki/Law_of_large_numbers 2025-12-05
[8] https://en.wikipedia.org/wiki/Student%27s_t-test 2025-12-07

hypothesis, the Person correlation method was selected to test the statistical significance and direction of the correlating relationship.
Utilising the above methodology we were able to compute significance and conclude results listed in the attachment[9] of this thesis.

# Hypotheses

1. H1 hypothesis: Knowledge about drones has a positive effect on their perception.
   1.1. $H1_0$: There is no positive relationship between the level of knowledge about drones and the level of positive perception towards them.
   1.2. $H1_1$: There is a positive relationship between the level of knowledge about drones and the level of positive perception (or attitude) towards them.
2. H2 hypothesis: Women perceive drones as a greater risk to their privacy than men.
   2.1. $H2_0$: There is no difference (or no greater risk) in the perceived threat of drones to personal privacy between women and men.
   2.2. $H2_1$: Women perceive a significantly greater risk from drones to their personal privacy than men.
3. H3 hypothesis: Urban society views the presence of drones more positively.
   3.1. $H3_0$: The urban population perceives the presence of drones more positively than the rural population.
   3.2. $H3_1$: There is no significant difference in the perception of drone presence between the urban and rural populations.
4. H4 hypothesis: There is a correlation between noise pollution and utility of a drone.
   4.1. $H3_0$: There is no negative correlation between the perceived usefulness of a drone and the perceived disturbance caused by its noise.
   4.2. $H3_1$: There is a negative correlation between the perceived usefulness of a drone and the perceived disturbance caused by its noise.

9 https://docs.google.com/document/d/1yhSNHgqUFwsVsQNXPbZdSon4-wTsxca2BZebGvT83HU/edit?tab=t.0#bookmark=id.4vozlqfw3358 2025-12-07

# Questionnaire

## Published URL

https://docs.google.com/forms/d/14u9qZOu3aKaElrWuNK4D5cvv9NpWyBvI0cJ8vtLcyok/preview

## Selecting questions into SWOT quadrants

### Strengths (S)

| Identifier | Focus of the statement | Attitude statement |
|---|---|---|
| S1 | Public safety | The everyday presence of drones significantly increases public safety. |
| S2 | Logistics | Drones enable faster and more efficient services. |
| S3 | Disaster management | Drones help in disaster and rescue situations. |
| S4 | Cost-effectiveness | Utilising drones is cost-effective in a lot of situations than deploying people. |

### Weaknesses (W)

| Identifier | Focus of the statement | Attitude statement |
|---|---|---|
| W1 | Noise pollution | The everyday presence of drones leads to disturbing noise pollution. |
| W2 | Critical infrastructure | Drones possess a threat for critical infrastructure. |
| W3 | Reliability | Drones are not yet technologically reliable. |
| W4 | Immediate risk | Drones imply a great risk of physical threat for anyone who stands under them. |

### Opportunities (O)

| Identifier | Focus of the statement | Attitude statement |
|---|---|---|
| O1 | Labor market | The rapid spread of drones provide new jobs in the field of drone development, operations and service. |
| O2 | Agriculture | Drones revolutionize the agricultural sector. |
| O3 | Transportation | Utilising drones decreases traffic and environmental pollution on public roads. |
| O4 | Research | Drone technology promotes scientific research and increases a country's potential for innovation. |

### Threats (T)

| Identifier | Focus of the statement | Attitude statement |
|---|---|---|
| T1 | Privacy | The spread of drones seriously endangers privacy. |
| T2 | Accidents | Drones increase the risk of accidents in the airspace. |
| T3 | Malicious act | Drones make it easier to execute malicious acts. |
| T4 | Regulation | Drones require complex and expensive regulation of the airspace. |

### Demographic questions

### Gender[10]

This question has 2 choices (Male, Female) and an “other” free entry text field.

## Grouping questions

### How familiar are you with drones or how often do you use them?[11]

This question had 4 group choices:

1. I have never encountered or engaged with drones[12]
2. I am aware of them; I have seen or heard about them in the media or in my environment[13]
3. I have operated a drone for a short period (e.g., at a friend's house)[14]
4. I regularly use drones (e.g., for hobby or as a profession)[15]

In order to group questionnaire participants into 2 groups for the independent samples Student’s $t$-test, the following mapping have been applied:

| Old group | New group (Familiarity group) |
|---|---|
| I have never encountered or engaged with drones | Less |
| I am aware of them; I have seen or heard about them in the media or in my environment | Less |
| I have operated a drone for a short period (e.g., at a friend's house) | More |
| I regularly use drones (e.g., for hobby or as a profession) | More |

[10] Neme
[11] Mennyire ismeri vagy használja a drónokat?
[12] Soha nem találkoztam / nem foglalkoztam velük
[13] Láttam már, vagy hallottam róluk a médiában / környezetemben
[14] Kezeltem már drónt rövidebb ideig (pl. ismerősnél)
[15] Rendszeresen használok drónt (pl. hobby vagy munka céljából)

# Results

## Methodology

| Tested hypothesis | Statistical test | Significance measurement | Result interpretation |
|---|---|---|---|
| $H1,\ H2,\ H3$ | Independent samples $t$-test | The $t$-test compares the means between two independent groups. | If $p < 0.05$, then the effect is statistically significant (reject $H_0$) |
| $H4$ | Person and Spearnam correlation | Correlation measures the strength and direction of the linear relationship between two continuous variables. | If $p < 0.05$, then the effect is statistically significant (reject $H_0$) |

## Significance

| Hypothesis | Statistical Test | Dependent Variable | Value | Result | Conclusion |
|---|---|---|---|---|---|
| H1: Knowledge has a positive effect on attitude | $t$-test | $SO\_Attitude$ (Positive attitude) | $p = 0.031$ | Statistically significant ($p < 0.05$) | Confirmed: Higher knowledge is associated with a more positive perception. |
| H2: Women perceive greater privacy concerns than men | $t$-test | $WT\_Attitude$ (Negative attitude) | $p = 0.773$ | Not statistically significant ($p \geq 0.05$) | Not confirmed: No significant difference between genders was found in overall threat perception. |
| H3: Urban population has a more positive attitude | $t$-test | $WT\_Attitude$ (Negative attitude) | $p = 0.002$ | Statistically significant ($p < 0.05$) | Surprising inverse finding: Urban residents hold a significantly higher negative attitude toward drones than rural residents. |
| H4: Inverse correlation between utility and noise | Pearson and Spearman Correlation | $SO\_Attitude$ (Positive attitude) vs. W1 (Noise) | $p < 0.001$ $r =- 0.208$ | Statistically significant ($p < 0.05$) | Confirmed: Greater perceived utility is strongly linked to lower sensitivity to noise pollution. |

# Hypotheses

## H1: Knowledge about drones has a positive effect on their perception

We categorized the questionnaire participants into 2 groups by their response on the "How familiar are you with drones or how often do you use them?"[16] question.

### Descriptives

| Group Descriptives | Group | N | Mean | SD | SE | Coefficient of Variation |
|---|---|---|---|---|---|---|
| SO_Attitude | Less | 154 | 3.766 | 0.666 | 0.054 | 0.177 |
| | More | 79 | 3.962 | 0.624 | 0.070 | 0.158 |
| WT_Attitude | Less | 154 | 3.061 | 0.718 | 0.058 | 0.235 |
| | More | 79 | 2.881 | 0.762 | 0.086 | 0.265 |

### Independent samples t-test (Student's t-test)

| | t | df | p | Mean Difference | SE Difference |
|---|---|---|---|---|---|
| SO_Attitude | -2.171 | 231 | 0.031 | -0.196 | 0.090 |
| WT_Attitude | 1.769 | 231 | 0.078 | -0.180 | 0.101 |

### Conclusion

Descriptives for H1 (Knowledge positively affects drone perception) support the hypothesis by comparing attitude means between groups with Less and More drone knowledge.

Positive Attitude (SO_Attitude): The "More" knowledge group shows a higher mean ($3.962$ vs. $3.766$) and less variation ($SD = 0.666$, $Coefficient\,of\,Variation = 0.177$), indicating a stronger, more consistent positive perception.

Negative Attitude (WT_Attitude): The "More" knowledge group has a lower mean ($2.881$ vs. $3.061$), suggesting less negative concern, which also supports a more positive perception.

These descriptive patterns confirm the statistically significant H1 result ($p = 0.031$): higher drone knowledge correlates with both higher positive and lower negative attitude scores.

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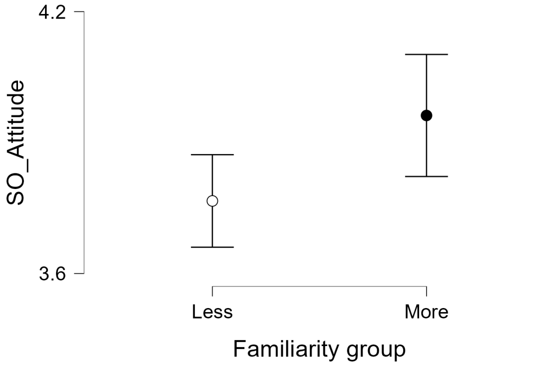
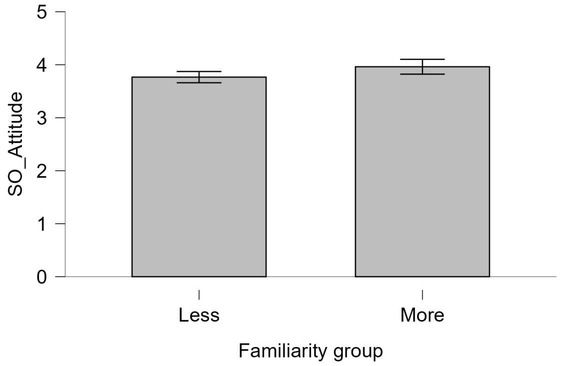
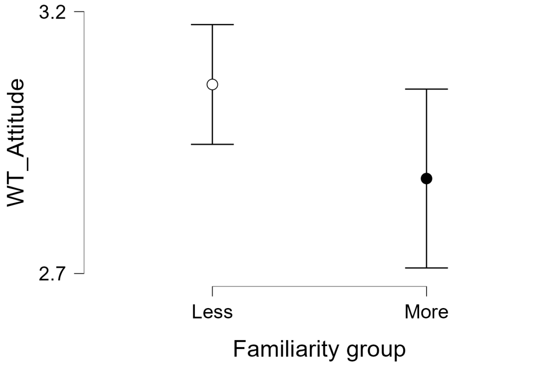


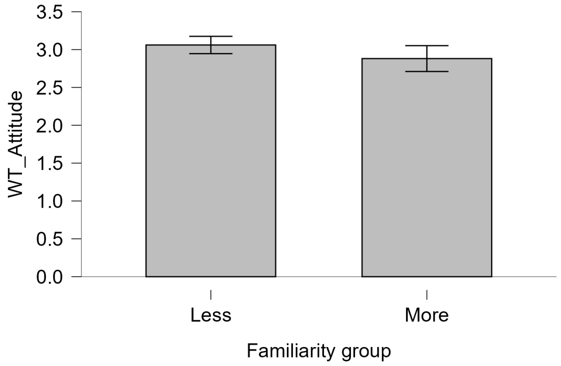

Image[17]: Positive attitude (SO_Attitude) comparison with descriptive plots between the two familiarity groups (More, Less).




Image[19]: Positive attitude (SO_Attitude) comparison with bar plots between the two familiarity groups (More, Less).




Image[18]: Negative attitude (WT_Attitude) comparison with descriptive plots between the two familiarity groups (More, Less).




Image[20]: Negative attitude (WT_Attitude) comparison with bar plots between the two familiarity groups (More, Less).

[17] H1_descriptives_SO_Attitude.png
[18] H1_descriptives_WT_Attitude.png
[19] H1_bar_plots_SO_Attitude.png
[20] H1_bar_plots_WT_Attitude.png

## H2: Women perceive drones as a greater risk to their privacy than men

### Descriptives

| Group Descriptives | Group | N | Mean | SD | SE | Coefficient of Variation |
|---|---|---|---|---|---|---|
| SO_Attitude | Male | 117 | 3.893 | 0.652 | 0.060 | 0.168 |
| | Female | 116 | 3.772 | 0.659 | 0.061 | 0.175 |
| WT_Attitude | Male | 117 | 3.014 | 0.771 | 0.071 | 0.256 |
| | Female | 116 | 2.986 | 0.704 | 0.065 | 0.236 |

### Independent samples t-test (Student's t-test)

| | t | df | p | Mean Difference | SE Difference |
|---|---|---|---|---|---|
| SO_Attitude | 1.415 | 231 | 0.158 | 0.122 | 0.086 |
| WT_Attitude | 0.288 | 231 | 0.773 | 0.028 | 0.097 |

### Conclusion

The analysis indicates that the null hypothesis ($H2_0$) (there is no difference in the perceived threat of drones to personal privacy between women and men) was not rejected.
This suggests that, for the measured group, gender does not play a significant role in determining the overall negative attitude toward drones (which includes privacy and threat concerns).

## H3: Urban society views the presence of drones more positively

### Descriptives

| Group Descriptives | Group | N | Mean | SD | SE | Coefficient of Variation |
|---|---|---|---|---|---|---|
| SO_Attitude | Rural | 65 | 3.812 | 0.664 | 0.082 | 0.174 |
| | Urban | 168 | 3.841 | 0.656 | 0.051 | 0.171 |
| WT_Attitude | Rural | 65 | 2.760 | 0.621 | 0.077 | 0.225 |
| | Urban | 168 | 3.093 | 0.758 | 0.058 | 0.245 |

### Independent samples t-test (Student's t-test)

| | t | df | p | Mean Difference | SE Difference |
|---|---|---|---|---|---|
| SO_Attitude | -0.304 | 231 | 0.761 | -0.029 | 0.096 |

| | | | | | |
|---|---|---|---|---|---|
| WT_Attitude | -3.158 | 231 | 0.002 | -0.333 | 0.106 |

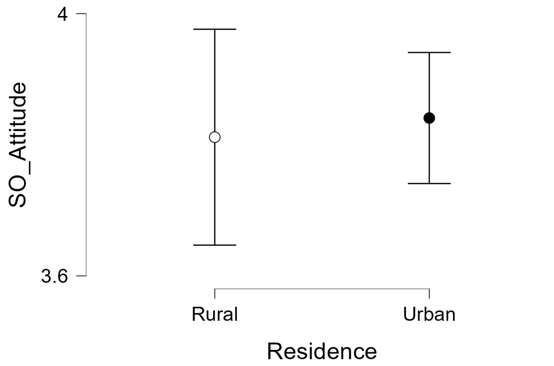
## Conclusion

This result is a surprising inverse finding. The initial expectation, typical in innovation adoption studies, was that urban areas (with higher density, technology familiarity and greater exposure to potential smart city applications) would be more receptive.

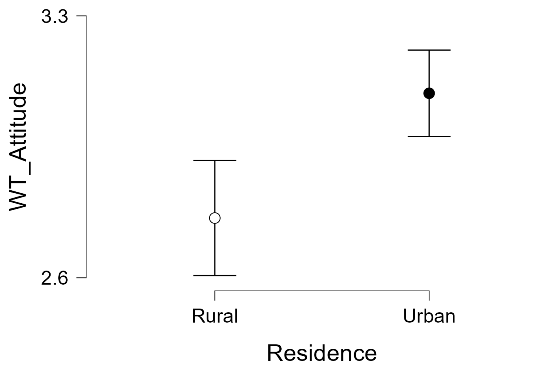
Instead, the higher negative attitude (WT_Attitude) in urban settings suggests that city dwellers are more acutely sensitive to negative factors of drone usage.

1. Noise pollution (W1): In dense environments, the noise drones make are more likely to be perceived as disturbing.
2. Privacy concerns (T1): Higher density means drones are more likely to capture private spaces, increasing surveillance and privacy anxieties.

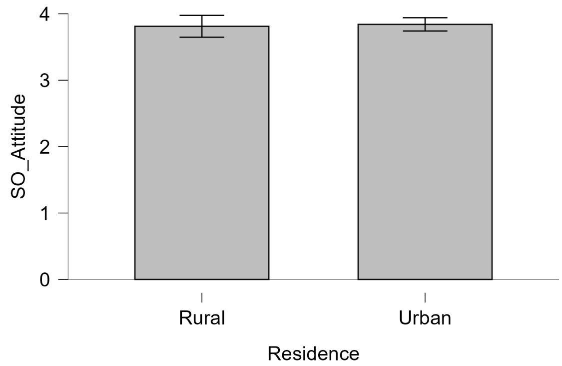
These findings imply that any drone implementation in urban centers (such as delivery or surveillance operations) requires strict regulation and careful service design to mitigate perceived disturbances and risks, rather than simply focusing on the technological utility. This runs counter to strategies targeting early technology adopters often found in urban hubs.



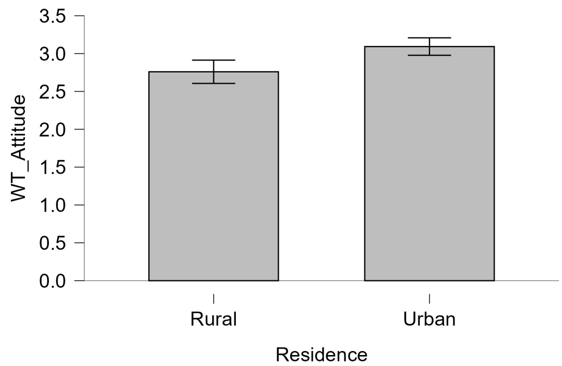

Image[21]: Positive attitude (SO_Attitude) comparison with descriptive plots between the two residency groups (Rural, Urban).




Image[22]: Negative attitude (WT_Attitude) comparison with descriptive plots between the two residency groups (Rural, Urban).




Image[23]: Positive attitude (SO_Attitude) comparison with bar plots between the two residency groups (Rural, Urban).




Image[24]: Negative attitude (WT_Attitude) comparison with bar plots between the two residency groups (Rural, Urban).

[21] H3_descriptives_SO_Attitude.png
[22] H3_descriptives_WT_Attitude.png
[23] H3_bar_plots_SO_Attitude.png
[24] H3_bar_plots_WT_Attitude.png

## H4: There is a correlation between noise pollution and utility of a drone

### Descriptives

| | Positive attitude (SO_Attitude) | | | | |
|---|---|---|---|---|---|
| W1 Likert | 1 | 2 | 3 | 4 | 5 |
| Valid | 38 | 54 | 88 | 35 | 18 |
| Missing | 0 | 0 | 0 | 0 | 0 |
| Median | 4.125 | 4.000 | 3.875 | 4.000 | 3.313 |
| Std. Deviation | 4.105 | 3.794 | 3.831 | 3.861 | 3.326 |
| Coefficient of variation | 0.167 | 0.172 | 0.153 | 0.135 | 0.269 |
| Variance | 0.472 | 0.424 | 0.343 | 0.270 | 0.804 |
| Range | 3.500 | 2.750 | 2.750 | 1.875 | 2.750 |
| Minimum | 1.500 | 2.125 | 2.250 | 2.750 | 2.000 |
| Maximum | 5.000 | 4.875 | 5.000 | 4.625 | 4.750 |

### Pearson and Spearman Correlation

Note: All tests are one-tailed for negative correlation.

| | | | Pearson | | Spearman | | |
|---|---|---|---|---|---|---|---|
| | | n | t | p | r | p | Covariance |
| W1 | SO_Attitude | 233 | -0.208 | <0.001 | -0.176 | 0.004 | -0.155 |

### Conclusion

The correlation analysis performed to test H4 found a $p$-value of $< 0.001$. Since this value is well below the conventional $\alpha = 0.05$ significance threshold, the result is deemed statistically significant. The null hypothesis ($H4_0$), which stated there is no negative correlation between perceived usefulness and noise disturbance, is therefore rejected.

The strength and direction of the linear relationship were measured using the Pearson correlation coefficient (r). The coefficient is negative ($r =- 0.208$). This confirms the hypothesized inverse relationship: As the score for perceived utility (SO_Attitude) increases (more positive), the score for perceived noise disturbance (W1) decreases (less disruptive). The magnitude of the correlation ($|r| \approx 0.2$) suggest a weak, but measurable relationship.

This is a critical implication for adoption strategies: Focusing on tangible benefits and positive services is more likely effective in increasing public tolerance for nuisance like noise than trying to address the noise issue in isolation.

# Discussion

1. What is the best method to analyze social attitude towards a conception?
2. What are the advantages and disadvantages of a few level (e.g: 5) versus many level Likert scale (e.g: 10)?
3. An odd or even leveled Likert scale would provide more precise results for our measurements?
4. What demographic group would have the most positive attitude towards drones?
5. What demographic group would have the most negative attitude towards drones?
6. What comes to mind when they hear a drone rotor?

# Future work

# Literature review

1. Strawser, Bradley Jay. "Moral predators: The duty to employ uninhabited aerial vehicles." Journal of Military Ethics 9, no. 4 (2010): 342-368.
    1.1. https://etica.uazuay.edu.ec/sites/etica.uazuay.edu.ec/files/public/Moral%20Reasoning%20A%20Text%20and%20Reader%20on%20Ethics%20and%20Contemporary%20Moral%20Issues%20%28%20PDFDrive%20%29.pdf#page=462
    1.2. “There is a worry that UAVs could lead to autonomous weapons that make lethal decisions on their own.”
    1.3. “I argue that remotely controlled weapons systems are merely an extension of a long historical trajectory of removing a warrior ever farther from his foe for the warrior’s better protection.”
    1.4. “My argument rests on the premise that if an agent is pursuing a morally justified yet inherently risky action, then there is a moral imperative to protect this agent if it possible to do so”
    1.5. “For any just action taken by a given military, if it is possible for the military to use UAV platforms in place of inhabited aerial vehicles without a significant loss of capability, then that military has an ethical obligation to do so.”
2. Wiesner, Ina. "A Sociology of the Drone." Journal of Military and Strategic Studies 18, no. 1 (2017).
    2.1. https://jmss.org/article/download/58280/43836
    2.2. “According to an interpretation in favour of combat drones, states are ethically obligated to use drones as the means of choice to spare the lives of their soldiers.”
    2.3. “In contrast to these technology-deterministic and microeconomic perspectives on technology development, sociologists interested in technology since the 1960s have regarded innovation and the diffusion of technologies as a social process, as innumerable decisions are made and negotiations are conducted in the course of technology development”
    2.4. “The sociology of technology not only asks about the conditions for the development of technology but also about the consequences of the introduction for societies, organisations and people. Remaining at first at the microsociological level, the questions arise, whether and how the existence of combat drones influences individuals in their behaviour.”
    2.5. “Drones are currently the highest developmental form of a military strategy orientation of armed services who wish to minimise their footprint in the operational theatre.”
    2.6. “By contrast, sociology studies the reasons for the development of technology and their long-term effects on social action, considering a longer background of time.”
3. Emimi, Mohamed, Mohamed Khaleel, and Abobakr Alkrash. "The current opportunities and challenges in drone technology." Int. J. Electr. Eng. and Sustain. (2023): 74-89.
    3.1. https://ijees.org/index.php/ijees/article/download/47/23
    3.2. “The process of globalization is being significantly influenced by the integration of technology, and among the technological advancements, drone technology stands out as a prominent example. Drones have witnessed a remarkable increase in their usage across various disciplines, including agriculture, healthcare, and military domains.”
    3.3. “However, it is crucial to acknowledge that despite their numerous benefits, drones can pose risks, such as potential injuries to individuals and damage to property,

especially when operated by untrained personnel or in the event of component failures during flight. Moreover, extremist elements can be hijacking drones to further their agendas and redirect the payload accordingly"

3.4. "The integration of Global Positioning System (GPS) technology and the availability of customizable applications for smartphones and tablets have significantly enhanced flight durations, reliability, and ease of operation."

3.5. "Moreover, drones can facilitate automated inspections to ensure compliance with social distancing protocols in public spaces, thus aiding in the management of the pandemic."

3.6. "The utilization of drones for the swift delivery of critical and life-saving medications to all members of society can contribute significantly to the realization of the goal of achieving universal health coverage. Furthermore, the logistics and transportation sectors stand to benefit from the integration of drones, offering opportunities for improved efficiency in the movement of goods and passengers."

3.7. "The transition of drones from their origins in military applications to their integration within civilian contexts has introduced regulatory challenges that must be addressed to fully harness the potential of this technology."

3.8. "One significant contribution of the multifaceted applicability of drones in the military, medical, and agricultural domains is the ability to enhance efficiency, effectiveness, and safety in various operations and activities."

3.9. "In agriculture, drones offer numerous benefits in improving farm management and optimizing agricultural practices. They provide real-time imagery, sensor data, and mapping capabilities, allowing farmers to monitor crop health, detect diseases, and assess the overall condition of their fields."

3.10. "The delegation of life-and-death decisions to automated systems or remote operators raises questions regarding accountability, transparency, and adherence to international laws of armed conflict."

4. Purahong, Boonchana, Thanavit Anuwongpinit, Aniwat Juhong, Isoon Kanjanasurat, and Chuchart Pintaviooj. "Medical drone managing system for automated external defibrillator delivery service." Drones 6, no. 4 (2022): 93.

4.1. https://www.mdpi.com/2504-446x/6/4/93

4.2. "CPR can only keep blood flowing to the heart and brain for a time. To restore the heart's normal rhythm, a device called an automatic external defibrillator (AED) must be used."

4.3. "When a person experiences a heart attack, their survival rate depends on the time elapsed between the onset of the heart attack and the time they are treated with an AED. The aim of our medical drone managing system is to deliver an automated external defibrillator to a patient in less time. The system can respond to the AED request within 5 min for a maximum distance of 5 km."

4.4. "The distance between the patient with the drone mobile app and the drone sever can be as far as 5 km. Local Wi-Fi hot spots cannot be applied, and 4G/5G mobile broadband must be used in our autonomous medical drone system for communicating with the PubNub cloud server."

4.5. "The drone ground station is designed to be mobile and can even operate the drones from a van equipped with 4G or 5G signals."

4.6. "The mission was successful. The weather conditions for the test fight date were as follows: temperature 29.4 °C, humidity 65%, and wind speed 12 km per hour. We also asked the drone administrator and volunteer for their opinions about the drone server application and the mobile application. The feedback was quite positive, especially regarding the ease of use, reliability, and accuracy of the application. The total elapsed time from the emergency call to the delivery of the AED was about 2 min, divided into ascending time of 6 s (30-m altitude), descending time of 12 s, and flight time of 2 min. The maximum flight time of the drone is 24 min for a payload of 800 g."

4.7. "One of the missing features of our medical drone managing system for automated external defibrillator delivery is obstacle avoidance. The medical drone managing system is hence not suitable to be operated in a city, where many obstacles can be found, including electrical wires and tall buildings. To be used in a city, an obstacle avoidance feature should be added."

4.8. "A drone propeller guard must be used to prevent any injury, especially when the drone flies near living humans or animals."

5. Tan, Lynn Kai Lin, Beng Chong Lim, Guihyun Park, Kin Huat Low, and Victor Chuan Seng Yeo. "Public acceptance of drone applications in a highly urbanized environment." Technology in Society 64 (2021): 101462.

5.1. https://dr.ntu.edu.sg/bitstreams/b73dd305-45fe-467e-8172-a13d23990c18/download

5.2. "First, using two knowledge tests, we were able to confirm that the majority of the public seems to have a good understanding of what a drone is. Second, acceptance levels towards drones did significantly differ depending on the context of use. Industrial areas had the highest acceptance level, followed by recreational areas and business districts while residential areas had the lowest acceptance level."

5.3. "We provided preliminary evidence that two factors – fears and concerns, and perceived potential benefits – affected the public acceptance levels differently depending on the contexts of drone applications."

5.4. "While drone technologies are not new, it has not permeated our daily lives until a few years ago. These days, news of emerging applications of drone technologies are ubiquitous. Be it for routine building inspection, constant security surveillance, or last mile commercial delivery, drone technologies have been touted as a cost-effective solution."

5.5. "To ensure successful implementation, social and psychological dimensions of drone operations in urban environment must be fully understood in order to enhance public acceptance of the technology."

5.6. "For instance, people may be more accepting of using drones for building inspection in industrial areas compared to residential areas. Similarly, people may be more receptive toward security surveillance in commercial and industrial areas compared to residential and recreational areas."

5.7. "Participants were asked single-itemed demographic questions pertaining to their gender, age, level of residence, occupation, annual income, industry, nature of work, and their highest educational qualification based on the Singapore education system."

5.8. "An independent t-test between males and females revealed that the gender effect on the picture-based test ($t(1042) = 3.51$, $p < .001$) where males were found to perform significantly better than females (male: $M = 4.87/ 6.00$, $SD = .76$, female: $M = 4.68/ 6.00$, $SD = .92$). However, there was no significant difference between males and females on the word-based test ($t(1043) = 1.27$, $p = .20$)."

5.9. “Based on a one-way ANOVA, there are no significant age effects on both test scores (picture-based: $F(6, 1043) = 0.54$, $p = .77$; word-based: $F(6, 1043) = .54$, $p = .39$).”

5.10. “There are significant differences between the various education levels of respondents on their scores on the picture-based test ($F(6, 977) = 3.51$, $p < .01$). There are also significant differences between the various education levels of respondents on the word-based test ($F(6, 977) = 6.33$, $p < .000$). For both tests, those who received a higher education were more likely to score high on the tests.”

5.11. “A one-way ANOVA test revealed non-significant effects of occupation (3 categorical options of student, working adult, or non-working adult) (picture: $F(2, 1047) = 0.25$, $p =.78$; word: $F(2, 1047) = 1.44$, $p = .24$).”

5.12. “Considering those who responded that they have active drone experience, those with

5.13. active experience scored significantly lower on the picture-based test than those without active experience with drones (active: $M = 4.67$, $SD = .86$; non-active: $M = 4.85$, $SD = .82$). There was no significant difference.”

5.14. “The top 4 fears and concerns indicated by the Singaporean public is misuse of drones by unauthorized personnel, inability to identify whether drones are filming or not, drones being a threat to one’s physical safety if parts of it falls, and loss of privacy.”

6. Clothier, Reece A., Dominique A. Greer, Duncan G. Greer, and Amisha M. Mehta. "Risk perception and the public acceptance of drones." Risk analysis 35, no. 6 (2015): 1167-1183.

6.1. https://eprints.qut.edu.au/80007/1/Authors%20Version%20-%20Manuscript%20Final.pdf

6.2. “The neutral response is likely due to a lack of knowledge about the technology, which was also identified as the most prevalent public concern as opposed to the risks associated with its use. Privacy, military use and misuse (e.g., terrorism) were also significant public concerns. The results suggest that society is yet to form an opinion of drones.”

# Attachments

## Formulas and metrics

1. SO_Attitude (Positive attitude)
   1.1. This metric represents the average Likert score related to Strengths (S) and Opportunities (O), indicating the perceived attitude towards drones. A higher SO_Attitude value signifies a more positive perception.
      1.1.1. $SO\_Attitude = \frac{S1+S2+S3+S4+O1+O2+O3+O4}{8}$
2. WT_Attitude (Negative attitude)
   2.1. This metric represents the average Likert score related to Weaknesses (W) and Threats (T), indicating the perceived attitude towards drones. A lower WT_Attitude value signifies a more positive perception.
      2.1.1. $WT\_Attitude = \frac{W1+W2+W3+W4+T1+T2+T3+T4}{8}$

## Abbreviations and expressions

1. SWOT analysis
   1.1. A strategic planning technique that identifies strengths (S), weaknesses (W), opportunities (O) and threats (T).
2. Likert scale
   2.1. A psychometric (sociology) scale used in research, named after its inventor, Rensis Likert[25].
3. Drone
   3.1. UAV (Unmanned aerial vehicle, Uninhabited aerial vehicles)
   3.2. UAS (Unmanned aerial system, Unmanned aircraft system)
   3.3. RPAS (Remotely piloted aerial system)
   3.4. UPS (Unpiloted system)
   3.5. UMS (Unmanned system)
   3.6. Aerial robot
4. Drones in the context of military application
   4.1. Uninhabited remotely controlled weapons
   4.2. PUR (Principle of unnecessary risk)
   4.3. IAW (Independent autonomous weapons)
   4.4. GWOT (Global war on terror)
5. Drones in the context of civilian application
   5.1. DO (Drone operations)
   5.2. DTCO (Drone-truck combined operation)
6. CPR (Cardiopulmonary resuscitation)
7. AED (Automatic external defibrillator)
8. GPS (Global positioning system)

[25] https://en.wikipedia.org/wiki/Rensis_Likert 2025-12-03