Corvus: Urban Air Mobility Solutions for Package Delivery
(Technical Paper)

The Potential Effects of Unmanned Aerial Systems and Urban Air Mobility
(STS Paper)

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

The central question of this prospectus is how the increase in the urban air mobility (UAM) industry will affect society, specifically the people in relatively dense cities. Urban air mobility refers to urban transportation systems that move people and objects by air. These transportation systems developed in response to traffic congestion (Engineering Board, 2019). UAM industry is growing and expanding at a rapid rate, and so far, government regulations are struggling to keep up. Many potential UAM ideas are ready for deployment and are simply awaiting new regulations and clearances from the Federal Aviation Administration (FAA), an example being Uber Elevate air taxis. Other potential UAM ideas are still in the development phase but hope to expand to doing real business in coming years, such as Amazon Air delivery drones. This topic is of immense importance as these industries have the potential to not only make billions in revenue, but to change the way modern cities operate from the ground up. Like many new technologies and industries, almost no studies have been conducted determining how this will affect society and life in cities where UAM is adopted, almost all research into this topic has been market analysis and investigations into potential profits and business opportunities.

STS Framework

There are a number of science, technology, and society (STS) theories that drive the technological factors behind the increased interest and rapid adoption of UAM. The social construction of technology (SCOT) theory holds that successful theories are as much a product of their social context as unsuccessful ones. In this context, that would mean a huge part of the reason UAM is being adopted is because of the social push for it. In this case, society is not specifically pushing for a technology such as UAM, society is pushing for a technology that claims it can alleviate the constantly worsening congestion of roadways and UAM happens to be the technology best suited for that. People in urban areas have dealt with standstill rush hour

traffic for decades now, the original solutions were technologies like commuter trains and subways, but as the population continues to skyrocket, those original solutions are now almost as cramped, overused, and congested as the roadways they were meant to help clear. The SCOT theory also argues that relevant social groups will have the most influence on what technologies get adopted, in this case, the relevant social group is all commuting persons in a city. This does not only include employees trying to get to work, but also students trying to get to school, delivery drivers and people using public transit like buses and subways. Eventually, through stabilization, one social group will prevail over the others and their solution will be adopted, it serves historically that the successful social group in this scenario will be the affluent working class and white-collar professionals. People of higher socioeconomic status are less likely to want to deal with the uncleanliness and inefficiency of public transit, additionally, people with higher wealth consistently have larger voices when it comes to shifts in society, as money plays a huge part in lobbying and determining the path of society. Part of the reason that the higher socioeconomic group will win over the others is that UAM is inherently expensive. Although things like infrastructure improvements to subways, making them faster, cleaner, and more energy efficient is also expensive, it is a solution that endures for years and will be easily accessible to all of that city's inhabitants. Meanwhile, the idea of an uber helicopter that will pick you up from your apartment and take you to work, or delivery of goods in less than thirty minutes using an autonomous drone are inherently more expensive for the consumers who choose to use them.

I also believe that the co-production of science and social order is an applicable STS theory to this thesis. It seems very likely that a new society will emerge around the new scientific idea of UAM. There will eventually be a society where you almost never will have to leave your

location to receive items, regardless of their size and cost within a few hours. Currently that designation only applies to food from places that deliver or utilize a delivery service, and select items from online warehouses such as Amazon, however in the near future, people will be able to have large items such as televisions and furniture delivered to any location in just a few hours. Additionally the transportation aspect of UAM will create a new society, eventually when the cost of UAM transportation is affordable to most everyone, people of higher socioeconomic status will be marketed luxury UAM methods with enhanced features, there will be UAM "party buses" where people can fly around the city rather than the current form of limo rides. In addition to the creation of new societal elements, UTM has already proven to be a driver of regulatory sciences and the construction of democratic politics. Already the FAA has implemented a method for drone registration, which is currently required for all remotely and autonomously flown aircraft in the United States. Additionally, the FAA and the National Aeronautics and Space Administration have teamed up with industry leaders in an attempt to create an automatic air traffic management (ATM) system for drones called the Unmanned Aerial System Traffic Management (UTM) system. This yet-to-be designed solution will ideally be able to issue commands to autonomous and remotely controlled drones, keeping them from crashing into one another and monitoring them as they go about their predetermined course. It is unknown when this technology will be completed and implemented, but it is currently in the works, and private industry leaders such as Amazon, UPS, and FedEx are heavily invested in its completion, so we can be sure development is moving as quickly as possible. This paper will further detail all of these points as they are examples of new regulatory elements as described by the co-production of science and social order STS theory. SCOT will be the main STS

framework; however, the co-production of science and social order will also be used to frame this paper.

Plan for the Thesis

This paper will be about how UAM will affect the evolution of urban society from both the standpoints of transit and delivery potential. This includes market analysis, and a summary of suspected new services that will be available within the next five to ten years by utilizing UAM and the FAA's UTM. Additionally, it will talk about the psychological factors of UAM on the people below. It is possible people would be extremely uncomfortable with aircraft flying above them and the streets of the city lugging around cargo and people. The more aircraft there are, the more likely there will be occasional mechanical errors, how will companies keep their craft from raining down on people below, how will people respond to living under the constant awareness such a scenario is possible. This could very possibly cause a shift in people's psychology, perhaps people will become numb to the UTMs existence, however it seems more likely people will be constantly paranoid and may constantly be looking up and distracted by them. This additional paranoia could snowball into some unintended consequences, which will also be a part of this study. If the potential for distraction proves to exist, that could be very dangerous for people on the ground as drivers, and construction workers, and pedestrians on the ground all need to be looking at where they are going and focusing on what they are doing, rather than watching UAMs buzz around overhead. I will do research into human psychology, it is well noted that many animals are fearful of shadows and large things above them due to birds of prey, I will research into whether this applies to humans as well. I also plan to do a survey both at the university and open online to try to determine how a large population would respond to such a thing.

References

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