

# Literature Review: Utility Function for Urban Air Mobility

## Bachelors Thesis of Daniel Du Bovis

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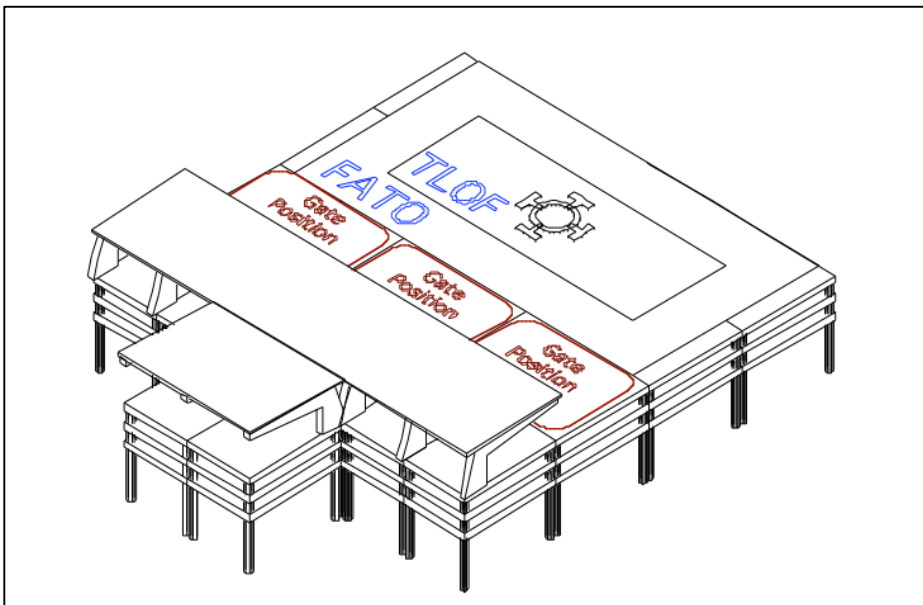
Climate change, new technologies and the need for alternate modes of transport has lead scientists and engineers to look to the sky for the next mobility option. Electric vertical take-off and landing (eVTOL) aircraft could free transportation from existing infrastructure, concomitant limitations and congestion.

Urban air mobility (UAM) may include private vehicles and public or on-demand services comparable to modern ride-sharing apps. To assess whether UAM would be adopted after implementation and based on the concept of utility maximization and discrete choice modelling, this thesis set out to review relevant literature and compile a utility function.

To this end, studies on UAM, urban modes of transport and vertiports were analysed and factors affecting travellers' choices collected. The literature on UAM showed persistent trends for travel cost and time throughout all studies; however, findings regarding other factors were inconsistent. This is not only because of the sparsity of studies on this topic but also due to eVTOL services being an abstract, unimplemented transportation method.

To mitigate this, trends in literature regarding established urban transport modes were taken into consideration. In addition, studies on vertiport locations and their constraints offered an insight into further UAM utility factors.

Factor F	Weight w	Pos./neg. influence
Noise pollution	$\alpha$	-
Safety	$\alpha$	+
Travel cost	$\alpha$	-
Travel time	$\alpha$	-
Access time	$\beta$	-
Age	$\beta$	/
Education	$\beta$	/
Egress time	$\beta$	-
Gender	$\beta$	/
Habits	$\beta$	-
Income	$\beta$	/
Reliability	$\beta$	+
Travel purpose	$\beta$	/
Value of time	$\beta$	+
Waiting time	$\beta$	-
Willingness to pay	$\beta$	+
Comfort	$\gamma$	+
Employment	$\gamma$	/
Travel distance	$\gamma$	+



The most important factors identified were travel cost, travel time, safety of UAM vehicles and noise pollution. The influence of age, income and gender, while still significant, cannot be defined as of yet.

Reliable results will only be available once eVTOL aircraft have been developed and tested. Noise pollution will have a major impact on vertiport locations and service accessibility. Furthermore, existing travel habits, as well as customers' safety concerns, will affect UAM usage.

Innovative ideas may help avoid certain limitations. Some researchers suggest appropriating oil rig platform technology to build modular vertiports over bodies of water adjacent to cities.