Role of innovativeness in US electric air taxi adoption dynamics

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Supplemental Information

I. Data

Data used in this study was collected using an online survey as part of research to understand airport mode choice behavior and preferences toward using Electric Air Taxis (EAT) for long-distance airport access trips in the United States (US). Before collecting data on mode choice and preferences, participants were provided with a detailed description of EAT, including images of the vehicle (exterior and interior) and the option to watch embedded YouTube videos featuring test flights from manufacturers.

After initial screening to identify the target population, a two-step quality control process was applied: the first step during data collection and the second step after data collection. The survey process was terminated if respondents failed to respond correctly to the trap questionnaires during data collection. Post-collection, responses exhibiting straight-line patterns (five or more consecutive identical responses across five or more of the nine pages containing attitudinal questions) were excluded from the final dataset. Descriptive statistics of respondents' demographic characteristics from 910 valid and fully completed survey responses used for analysis are presented in Table SI-1.

Table SI-1: Descriptive statistics of respondents' sociodemographic characteristics

Variable	#	%
Age (years): Youth (18-34)	264	29.01
Adult (35-64)	454	49.89
Older adult (65+)	192	21.10
Household income: Low (less than $50K)	303	33.30
Middle ($50-99.9K)	319	35.05
High ($100K or more)	279	30.66
Prefer not to answer	9	0.99
Gender: Female	469	51.54
Male	439	48.24
Other	2	0.22
Education: Some college (no degree) or less	383	42.09
Associate's degree or Trade school certificate	155	17.03
Bachelor's degree	241	26.48
Master's degree	106	11.65
Professional or Doctoral degree	25	2.75
Adults in household (#): 1 adult	228	25.05
2 adults	507	55.71
3 or more adults	175	19.23
Children in household (#): No children	567	62.31
1 child	168	18.46
2 children	118	12.97
3 or more children	57	6.26
Cars in household (#): No cars	11	1.21
1 car	388	42.64
2 cars	382	41.98
3 or more cars	129	14.18
Student: No	776	85.27
Yes, part-time	45	4.95
Yes, full-time	89	9.78
Worker: No	282	30.99
Yes, part-time	123	13.52
Yes, full-time	505	55.49
US region: Northeast	105	11.54
South	449	49.34
Midwest	213	23.41
West	143	15.71

Regarding the measure of EAT perceptions, intention to use, and individual innovativeness, multiple items were adopted from previous studies and evaluated on a 5-point Likert scale with superficial adjustments to comply with the study context. Items measuring EAT perceptions and intention to use were adapted from Kim et al. (2023) and Yuen et al. (2020) and Rejali et al. (2023), while individual innovativeness was measured using five items from a consumer innovativeness scale originally developed by Goldsmith & Hofacker (1991). Figure SI-1 presents the items used for measurement and the distribution of responses to the determinants of technology acceptance from UTAUT and individual innovativeness.

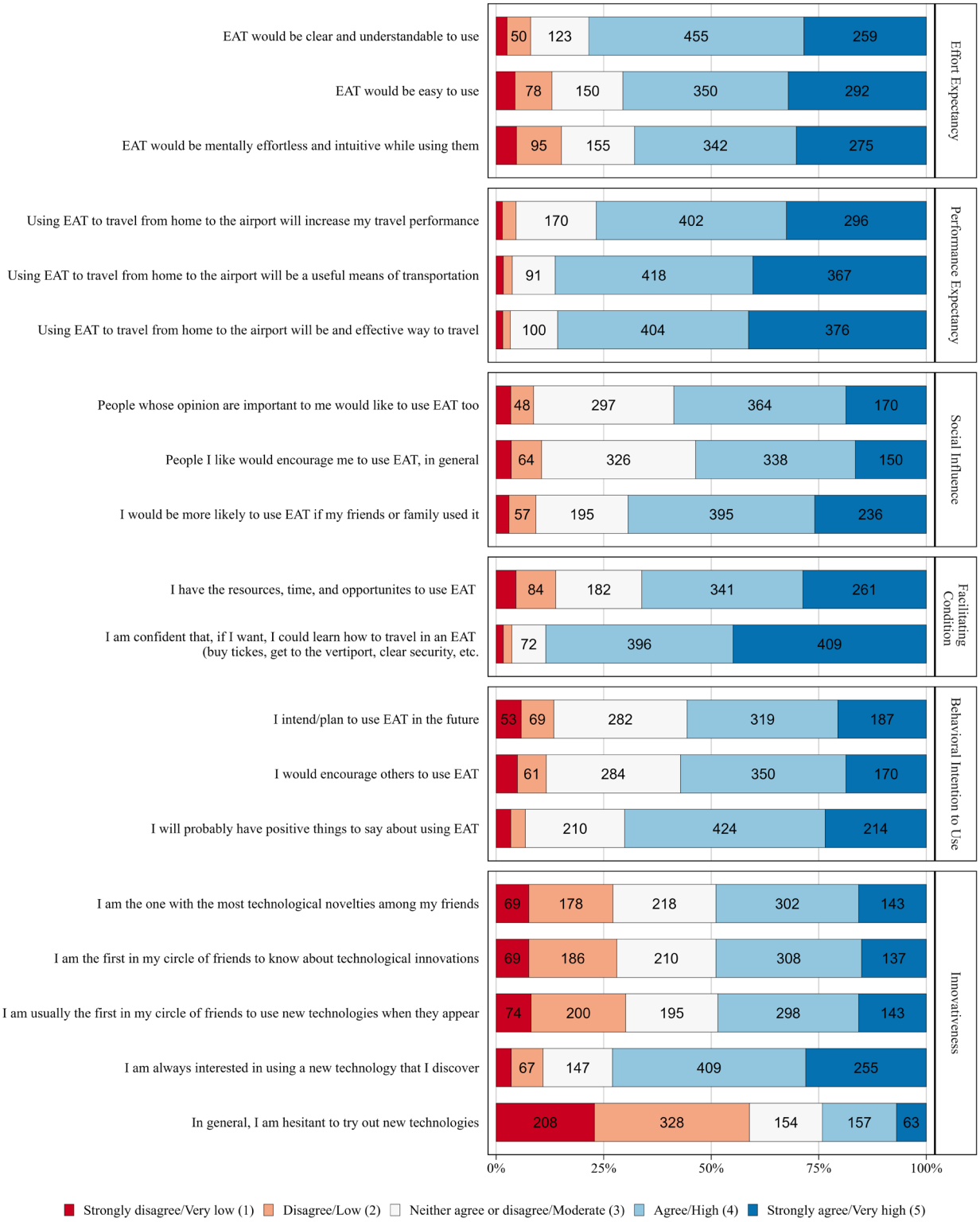

Figure SI-1: Responses to questions about EAT perceptions, intention to use, and innovativeness

II. Additional Results

Before calculating each individual's innovativeness factor score, confirmatory factor analysis (CFA) was performed to confirm the factor structure of the scale used to measure innovativeness. Table SI-2 below presents results from the CFA.

Table SI-2: CFA results for the innovativeness latent variable

Construct	*Item*	*λ*	*p-value*	*AVE*	*CR*	*α*
Innovativeness	INN-1	0.891	0.000			
	INN-2	0.916	0.000			
	INN-3	0.928	0.000	0.627	0.874	0.871
	INN-4	0.714	0.000			
	INN-5	0.360	0.000			
Fit statistics: $N = 910$, $\chi^2(df=5) = 76.454$, p-value < 0.001; SRMR = 0.041, CFI = 0.977, TLI = 0.954, RMSEA = 0.125						

Notes: λ = factor loading; AVE = average variance extracted; CR = composite reliability; α = Cronbach's alpha; N = number of observations; χ^2 = chi-square statistic; df = degrees of freedom; SRMR = Standardized Root Mean Squared Residual; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation.

After determining each individual's innovativeness factor score from the CFA results, the k-means clustering algorithm was applied to categorize individuals into three groups based on their innovativeness. This algorithm was used to generate breakpoints on the innovativeness factor scores, enabling the classification of individuals. An average silhouette score of 0.51 was obtained, indicating a reasonable clustering structure for the three groups created based on innovativeness using the k-means algorithm (Kaufman & Rousseeuw, 1990). Figure SI-2 presents the box plot of factor scores for the three innovativeness groups used in the study.

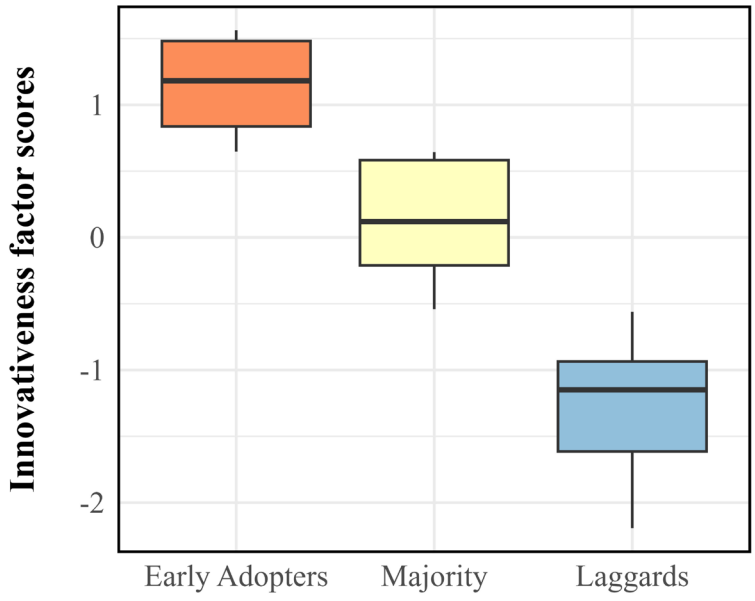

Figure SI-2: Box plots of innovativeness factors scores by group

Before conducting the measurement invariance test—to ensure that the measured EAT perceptions and intention to use have the same meaning across different categories of innovators—we first performed a multi-group CFA, with the factor structure same across groups, as shown in Table SI-3.

Table SI-3: Multi-group CFA results for attitudes and intention to use EAT

		Early Adopters (N = 248)		***Majority (N = 392)***		***Laggards (N = 270)***	
Construct	***Item***	***λ***	***p-value***	***λ***	***p-value***	***λ***	***p-value***
Behavioral Intention of Use	INT-1	0.870	0.000	0.848	0.000	0.884	0.000
	INT-2	0.853	0.000	0.881	0.000	0.837	0.000
	INT-3	0.811	0.000	0.751	0.000	0.905	0.000
Performance Expectancy	PE-1	0.755	0.000	0.651	0.000	0.785	0.000
	PE-2	0.722	0.000	0.882	0.000	0.945	0.000
	PE-3	0.706	0.000	0.875	0.000	0.953	0.000
Effort Expectance	EE-1	0.791	0.000	0.648	0.000	0.655	0.000
	EE-2	0.750	0.000	0.810	0.000	0.891	0.000
	EE-3	0.652	0.000	0.598	0.000	0.769	0.000
Social Influence	SI-1	0.774	0.000	0.723	0.000	0.801	0.000
	SI-2	0.851	0.000	0.858	0.000	0.850	0.000
	SI-3	0.422	0.000	0.437	0.000	0.669	0.000
Facilitating Condition	FC-1	0.637	0.000	0.603	0.000	0.615	0.000
	FC-2	0.519	0.000	0.603	0.000	0.795	0.000

Fit statistics: χ^2(df=201) = 306.899, p-value < 0.001; SRMR = 0.033, CFI = 0.984, TLI = 0.978, RMSEA = 0.042

Notes: *N* = number of observations; λ = factor loading; χ^2 = chi-square statistic; df = degrees of freedom; SRMR = Standardized Root Mean Squared Residual; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation.

To confirm the measurement invariance of the innovativeness scale across the three innovativeness groups identified earlier, we followed the criteria established by Cheung and Rensvold (2002), suggesting not to reject null hypothesis of invariance testing (*H0: No significant difference in the measured parameters between the groups being compared*) for ΔCFI (Comparative Fit Index) of smaller than or equal to –0.01. Based on this criteria, we confirmed measurement invariance across the configural (factor structure same across groups), metric (factor loadings same across groups), and scalar models (factor loadings and intercepts same across groups), as shown in Table SI-4.

Table SI-4: Invariance testing results for innvativeness latent variable across groups

Invariance level	χ^2	***df***	***CFI***	***Comparison***	$\Delta\chi^2$	***Δdf***	***p-value***	***ΔCFI***
Configural	306.90	201	0.984	--	--	--	--	--
Metric	381.72	219	0.975	Configural	74.816	18	0.000	0.009
Scaler	417.68	237	0.972	Metric	35.964	18	0.007	0.003

Notes: χ^2 = Chi-Square; df = degrees of freedom; CFI = Comparative Fit Index

Once measurement invariance was established, we obtained the scalar model, which served as the structural mean model (SMM) following Müller & Schäfer (2017) as shown in Figure SI-3. This model provided estimates of the latent variable means and allowed comparison of means across different innovativeness groups.

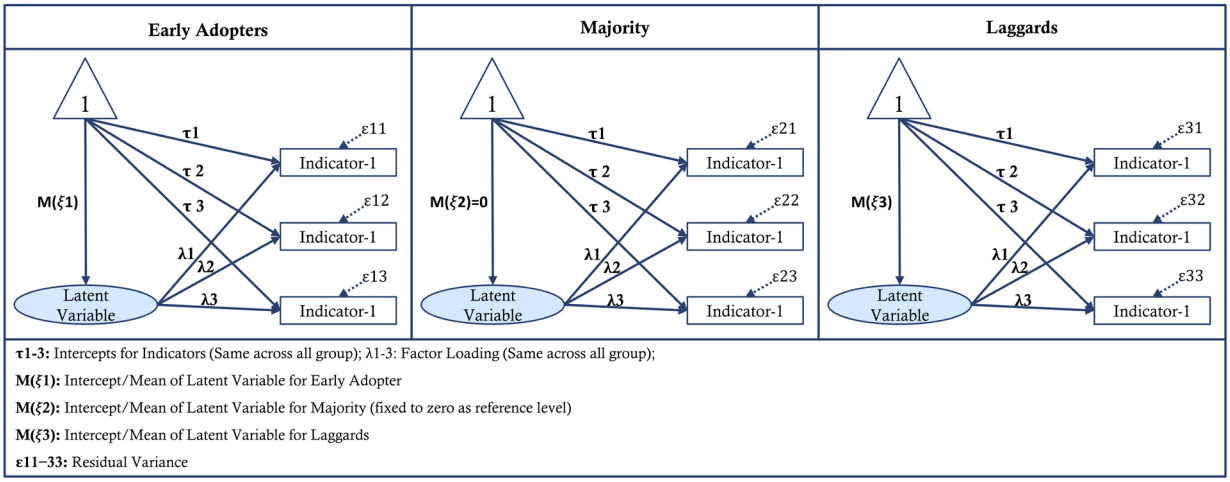

Figure SI-3: Method of structural mean modeling for the multi-group CFA

Lastly, SMM was extended to include paths between latent variables in multi-group Structural Equation Modeling (SEM), with results shown in Table SI-5 below.

Table SI-5: Multi-group SEM structural model results for intention to use EAT

Endogenous variable	***Exogenous variable***	***Early Adopters (N = 248)***		***Majority (N = 392)***		***Laggards (N = 270)***	
		β	***p-value***	*β*	***p-value***	*β*	***p-value***
Behavioral Intention of Use	Performance Expectancy	0.189	0.213	0.383	0.000	0.345	0.000
	Effort Expectance	0.378	0.003	0.326	0.000	0.320	0.000
	Social Influence	0.671	0.000	0.294	0.000	0.302	0.000
	Facilitating Condition	-0.140	0.637	-0.092	0.242	0.302	0.514
Fit statistics: χ^2(df=237) = 417.679, p-value < 0.001; SRMR = 0.054, CFI = 0.972, TLI = 0.968, RMSEA = 0.050							

Notes: *N* = number of observations; *β* = path coefficient; χ^2 = chi-square statistic; df = degrees of freedom; SRMR = Standardized Root Mean Squared Residual; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation.

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