29-30 Οκτώβριος 2026 | Συνεδριακό Κέντρο Φιλοξενία
Λευκωσία, Κύπρος

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Βιώσιμης Κινητικότητας
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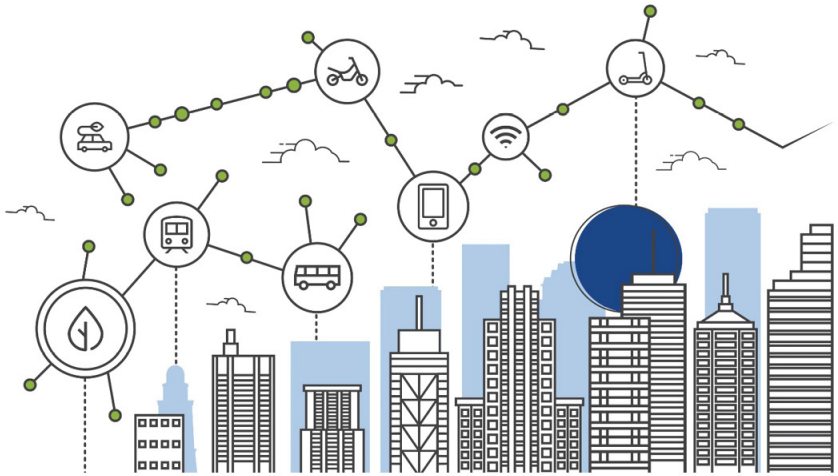
Μεταφορών

Κόμβοι Κινητικότητας για Βιώσιμη Αστική Κινητικότητα: Εμπειρίες από τη Μεσόγειο και Προοπτικές για την Κύπρο

Mobility Hubs for Sustainable Urban Mobility: Mediterranean Insights and the Cyprus Perspective

Christos Gkartzonikas

Research Associate
Lab for Transport Engineering
University of Cyprus



Το Συνέδριο υλοποιείται στο πλαίσιο του Προγράμματος Πολιτικής Συνοχής «ΘΑΛΕΙΑ 2021-2027» με τη συγχρηματοδότηση της ΕΕ.

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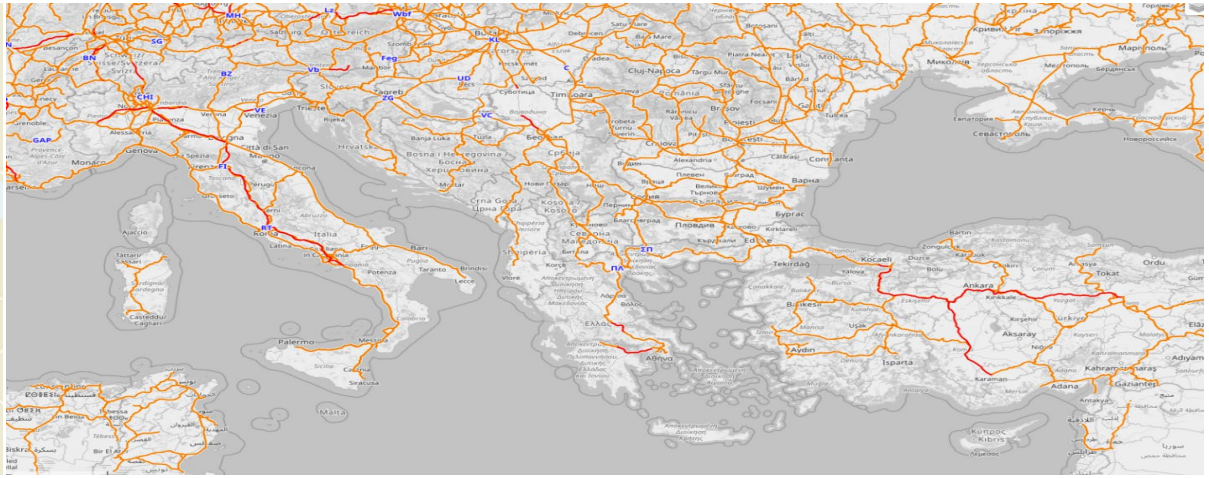
Why so much buzz about Mobility Hubs?

- The Mediterranean Region faces unique transport challenges characterized by dispersed population distributions, suburban/rural peripheries and significant variations in population density between urban centers and coastal areas.
- MED countries often exhibit highly centralized urban development with substantial rural populations lacking comprehensive, sustainable connectivity.
- In Northern/Central Europe mobility hubs have emerged as a response to issues of connectivity and multi-modality.
- MED transport infrastructure however presents different challenges, with rail networks primarily serving major urban centers while leaving rural and coastal areas underserved.





So, what is a mobility hub?

Mobility hubs are:

- meeting points for shared and active mobility within the existing public transport system.
- places of intermodal connectivity
- mobility- related services such as parking facilities, and non- mobility related services such as food and drink kiosks are often integrated
- the aim is to centralize mobility and other resources, ensuring an easy access between modes and the first- and last-mile connectivity.



Transportation Modes:

- Public Transportation: Bus, Tram, Metro, Train,…
- Shared Mobility: Bikes, Scooters, Cars, Carpooling
- Active Mobility: Parking spaces for own bikes, connectivity to bike paths and pedestrian
- On-demand service: Taxi stands, Ride-hailing pick-up & drop-off zones, DRT services

Mobility-related Services:

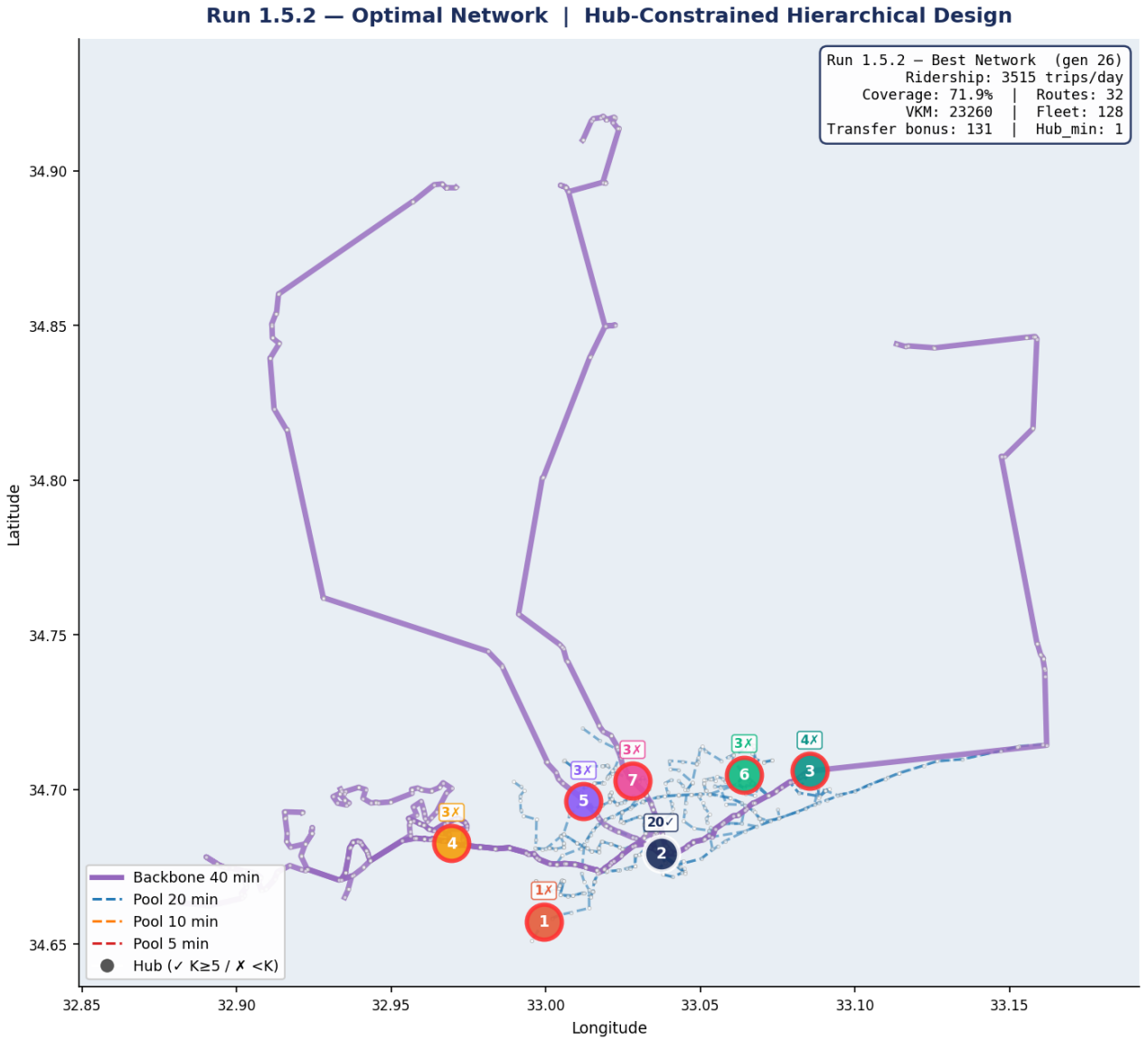
- Car e-charging Infrastructure
- Car parking spaces

Non-mobility related services:

layout areas, food/drink kiosks, delivery lockers, shops, playground, WiFi, public toilets, and the list goes on…

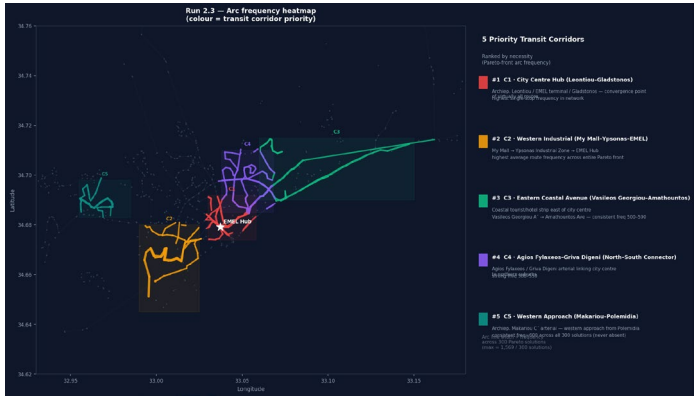
But #1… – Mobility Hubs in TrNDP

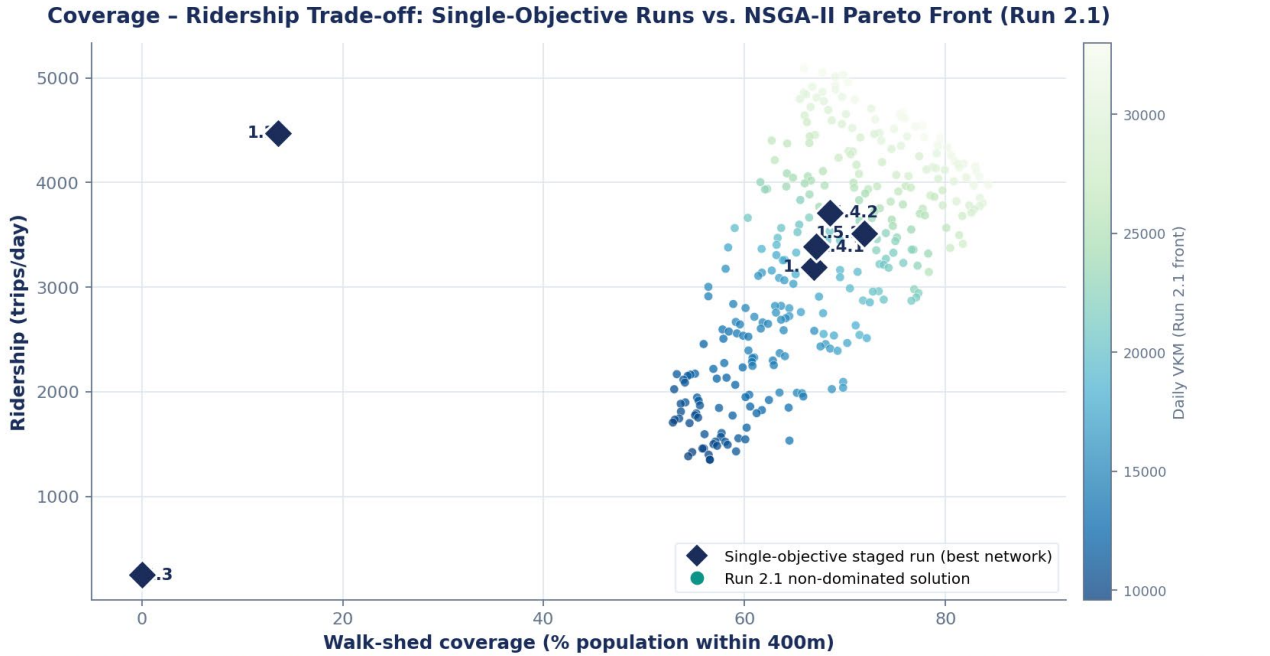
- Mobility hubs constitute an important but a single component
- Integrating them into solving a transit network design problem is key!
- Can provide single objective solutions
  - For example, we can observe that Hub#2 in a 7-hub network provides better service
  - More bus routes serving Hub#2



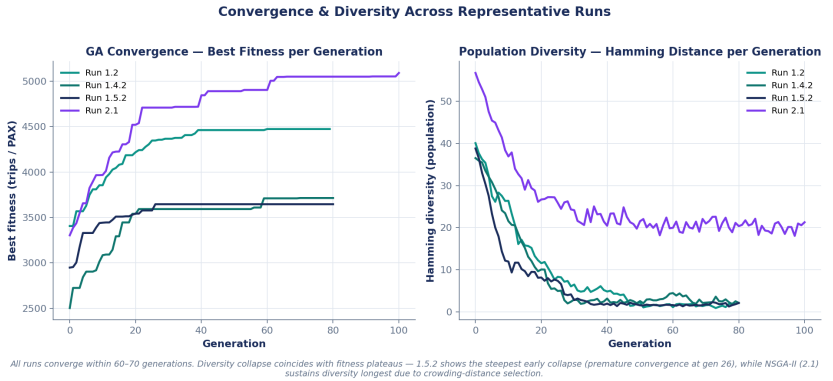
But #1… – Mobility Hubs in TrNDP

- Need to be integrated into multi-objective solutions
  - Maximize ridership
  - Maximize coverage
  - Minimize vehicle-kms
  - …
- The single solution is replaced with a Pareto front (e.g., surface providing trade-offs)
- So, decision-makers can make informed choices





Single-objective runs sit ON or BELOW the Pareto envelope they helped motivate — the NSGA-II front (Run 2.1) spans a far wider, continuously-tunable coverage–ridership space than any single hand-tuned constraint setting.



All runs converge within 60–70 generations. Diversity collapse coincides with fitness plateaus — 1.5.2 shows the steepest early collapse (premature convergence at gen 26), while NSGA-II (2.1) sustains diversity longest due to crowding-distance selection.

But #2… – User-centric approach?

- Mobility hubs are increasingly promoted, but their design is often **supply-driven** → limited evidence on **how users value different mobility hubs features** + willingness to pay for service improvements is rarely quantified.
- Mobility hubs elements (availability of transportation modes, information provision, physical design, digital integration through a smartphone app) are **interdependent**.
- **User preferences vary** across socio-demographic and cultural contexts.
- Analysis was conducted by collecting stated preference survey responses (≥1,350) from Bosnia & Herzegovina, Cyprus, Greece, Italy, Malta, and Spain.
    - The main aim is to identify which features are **universally valued** and which require **context-sensitive investment strategies**.
- Develop six separate multivariate ordered probit models given that the mobility hub elements are interrelated.

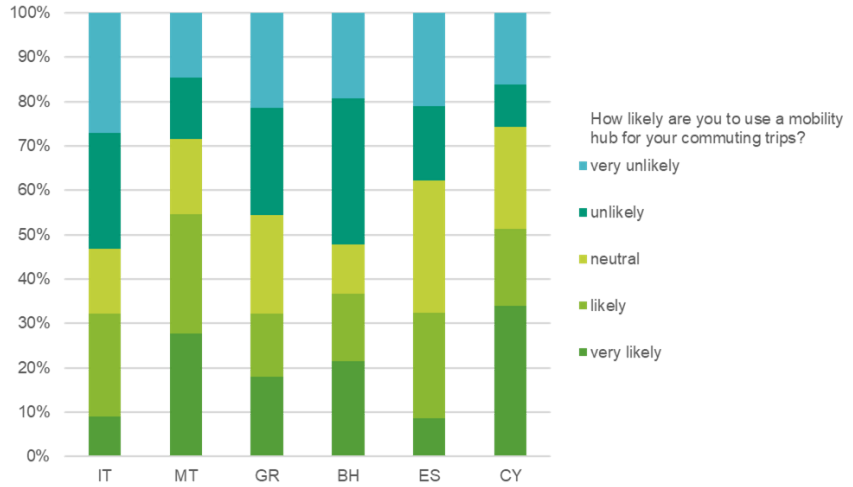
Results – Overall adoption and services

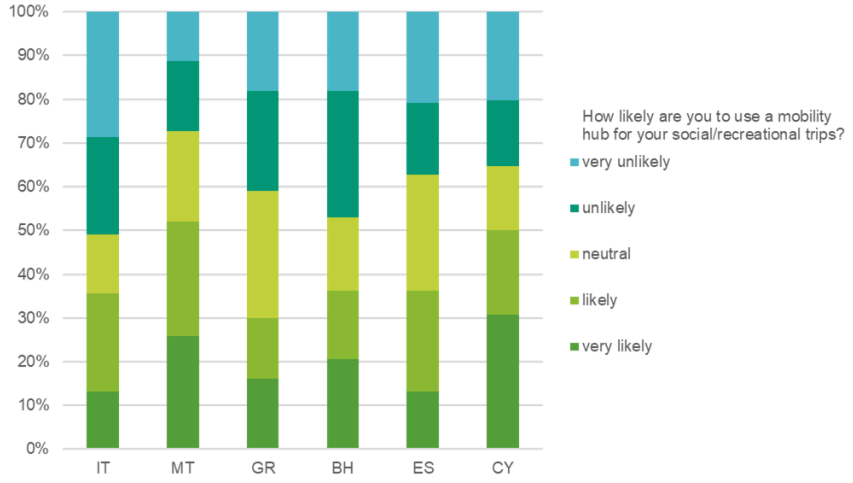
Overall Adoption:

- Higher willingness for social/leisure trips than commuting.
- Strongest uptake in Italy, Spain, Cyprus; more hesitation in Greece and Bosnia & Herzegovina.

Service-specific Uptake:

- Shared bikes & e-scooters → Positive in Italy, Spain, Cyprus; low in Malta, Greece, Bosnia & Herzegovina (safety/infrastructure gaps).
- Car-sharing & ride-hailing → Broad acceptance in Spain, Italy, Malta; weaker in Greece and Bosnia & Herzegovina.
- PT in hubs → Trusted in Spain & Italy; mixed in Malta, Greece, Bosnia & Herzegovina.
- DRT → Openness in Spain & Italy; limited awareness elsewhere.





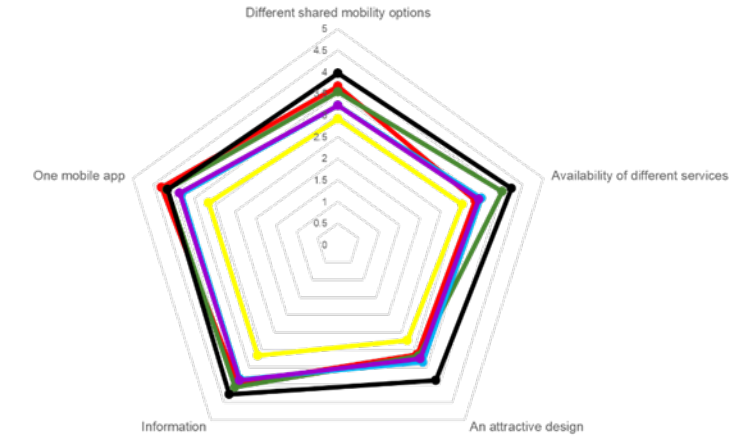
Results – Features in MH

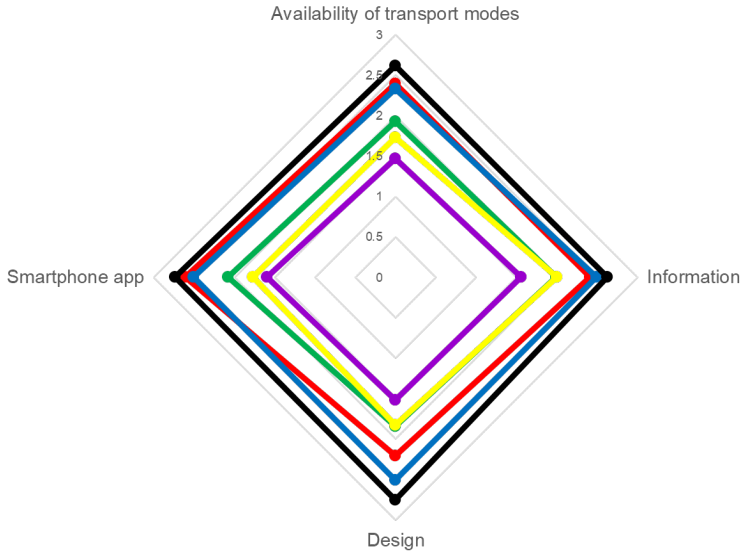
Most Valued Features:

- Integration & availability of modes → Top across all countries.
- Real-time information & smartphone apps → Reduce complexity, build trust.
- Design/aesthetics → Secondary but relevant (esp. in Greece).

Cost Sensitivity:

- Citizens prioritize modes & information even at higher costs
- Smartphone apps especially valued in Italy & Spain.
- Design rated least important but helps attract skeptical users.





Results – MH public perceptions in CY

Cyprus:

- Younger and innovative users are more willing to pay for MH improvements.
- Predominant car users are resistant, especially to digital integration.
- Younger users are eager for availability and digital integration improvements.
- Female respondents value information and smartphone integration more.
- PT proximity reinforces valuation of availability and information.
- Car-centric culture constrains acceptance of cost increases.

	Availability of transportation modes	Information	Design	Smartphone app
Bosnia & Herzegovina / Variable	**Estimated parameter (p-value)**	**Estimated parameter (p-value)**	**Estimated parameter (p-value)**	**Estimated parameter (p-value)**
Constant	0.148**	0.106**	0.228***	0.172***
Respondents that are female	0.127*	n.s.	0.132*	0.165*
Respondents that are between 18-24 years old	0.311**	0.284**	0.209*	0.269**
Respondents that are 55 years old and over	-0.190*	-0.215*	n.s.	-0.228*
Respondents that reside in households of 1 or 2 people	-0.156*	-0.179*	n.s.	-0.140*
Respondents that they have access to 0 or 1 vehicles in their households	0.275**	0.202**	0.181*	0.259**
Respondents that have a bus stop within a walking distance of 400m from their residences	n.s.	0.177*	0.163*	n.s.
Respondents that are driving alone more than 10 trips per week	-0.315***	-0.289**	-0.241**	-0.328***
Respondents that are carpooling at least 1-3 trips per month	0.192**	n.s.	0.154*	n.s.
Respondents that are using public transportation at least 1-3 trips per month	0.322**	0.295***	0.209***	0.276**
Respondents that are cycling at least 1-3 trips per month	n.s.	0.143*	n.s.	n.s.
Respondents with a higher affinity to innovativeness	0.382***	0.421***	0.331**	0.448***
Threshold 1	0.608***	0.727***	0.668***	0.584***
Threshold 2	1.314***	1.5081***	1.427***	1.336***
McFadden pseudo ρ^2	0.154			
Log-likelihood at convergence	-842.26			
Number of observations	205			
Cyprus / Variable				
Constant	0.171**	0.262***	0.198**	0.231**
Respondents that are female	n.s.	0.151*	n.s.	0.188*
Respondents that are between 18-24 years old	0.282**	0.240**	0.213*	0.265**
Respondents that are 55 years old and over	-0.211*	-0.195**	n.s.	-0.202*
Respondents that reside in households of 1 or 2 people	-0.177*	n.s.	-0.145**	n.s.
Respondents that they have access to 0 or 1 vehicles in their households	0.308***	0.264***	0.219**	0.288**
Respondents that have a bus stop within a walking distance of 400m from their residences	0.203*	0.224**	n.s.	n.s.
Respondents that are driving alone more than 10 trips per week	-0.356***	-0.328**	-0.295**	-0.369***
Respondents that are carpooling at least 1-3 trips per month	n.s.	0.178*	n.s.	n.s.
Respondents that are using public transportation at least 1-3 trips per month	0.297**	0.285**	0.207*	0.271**
Respondents that are cycling at least 1-3 trips per month	n.s.	0.138*	n.s.	n.s.
Respondents with a higher affinity to innovativeness	0.359***	0.394**	0.306**	0.427***
Threshold 1	0.578***	0.551***	0.628***	0.513***
Threshold 2	1.205***	1.184***	1.338***	1.172***
McFadden pseudo ρ^2	0.172			
Log-likelihood at convergence	-783.48			
Number of observations	257			
Spain / Variable				
Constant	0.285***	0.227***	0.204***	0.185**
Respondents that are female	0.165**	n.s.	0.174*	n.s.
Respondents that are between 18-24 years old	0.296**	0.272**	0.225**	0.283**
Respondents that are 55 years old and over	-0.226*	-0.213*	n.s.	-0.218*
Respondents that reside in households of 1 or 2 people	-0.148*	n.s.	-0.162*	n.s.
Respondents that they have access to 0 or 1 vehicles in their households	0.248**	0.217*	0.189*	0.233**
Respondents that have a bus stop within a walking distance of 400m from their residences	0.212*	0.197*	n.s.	n.s.
Respondents that are driving alone more than 10 trips per week	-0.331***	-0.304**	-0.272**	-0.344***
Respondents that are carpooling at least 1-3 trips per month	0.178**	n.s.	n.s.	0.161*
Respondents that are using public transportation at least 1-3 trips per month	n.s.	0.315*	n.s.	0.326**
Respondents that are cycling at least 1-3 trips per month	0.171*	0.159*	0.182**	n.s.
Respondents with a higher affinity to innovativeness	0.378**	0.399**	0.314**	0.440***
Threshold 1	0.734***	0.619***	0.671***	0.752***
Threshold 2	1.578***	1.418***	1.483***	1.608***
McFadden pseudo ρ^2	0.183			
Log-likelihood at convergence	-694.11			
Number of observations	250			

Conclusions

Cross-country synthesis:

- User willingness to pay **varies substantially across countries** and mobility contexts.
- **Cost sensitivity** is highest in car-centric and early-stage multimodal systems (Cyprus, BH, MT).
- **Availability of transportation modes** takes priority over digital features where alternatives to private cars are limited (BH, MT); proximity to public transport reinforces its valuation (Cyprus).
- Digital and informational features are valued mainly in more advanced multimodal systems (ES, GR, IT).
- Preferences reflect **structural conditions**, not only individual attitudes.
- Mobility hubs are perceived as **integrated** systems, not as isolated components.
    - MH gain value through integration with public transport and complementary services (ES, GR, IT)
    - MH nearby public transport strengthens willingness to pay for availability and information (Cyprus)
- **Cultural, infrastructural**, and **behavioral** factors jointly shape adoption potential.
- Early-stage systems prioritize **access**; mature systems prioritize **integration** and **quality.**

Conclusions

Policy Implications:

- Mobility hubs investments should be **tailored** to local mobility maturity.
- **Physical infrastructure** must precede digital and informational enhancements.
- **User-centered** valuation should guide investment priorities.
- Cost-sensitive contexts require **gradual**, low-risk deployment strategies.
- **Digital integration** should be prioritized where multimodal use is already high.
- Avoid **one-size-fits-all** mobility hubs designs across different regions.
- Align policy ambition with **behavioral readiness** and **infrastructural capacity**.
- **Pilot** projects can test acceptance before large-scale deployment.
- **Continuous** user feedback should inform adaptive planning and design.
- **Cross-sector coordination** (transportation, land use, digital services) is necessary for effective MH deployment.



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Christos Gkartzonikas
gkartzonikas.christos@ucy.ac.cy
Lab for Transport Engineering - University of Cyprus

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