Electric Vehicle Battery Swapping Station

- Kvantifikacija rizika u postizanju strateških ciljeva integracije električnih vozila -

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Završna diseminacija projekta

FER, Zagreb, 27. rujna 2018

O projektu EVBASS

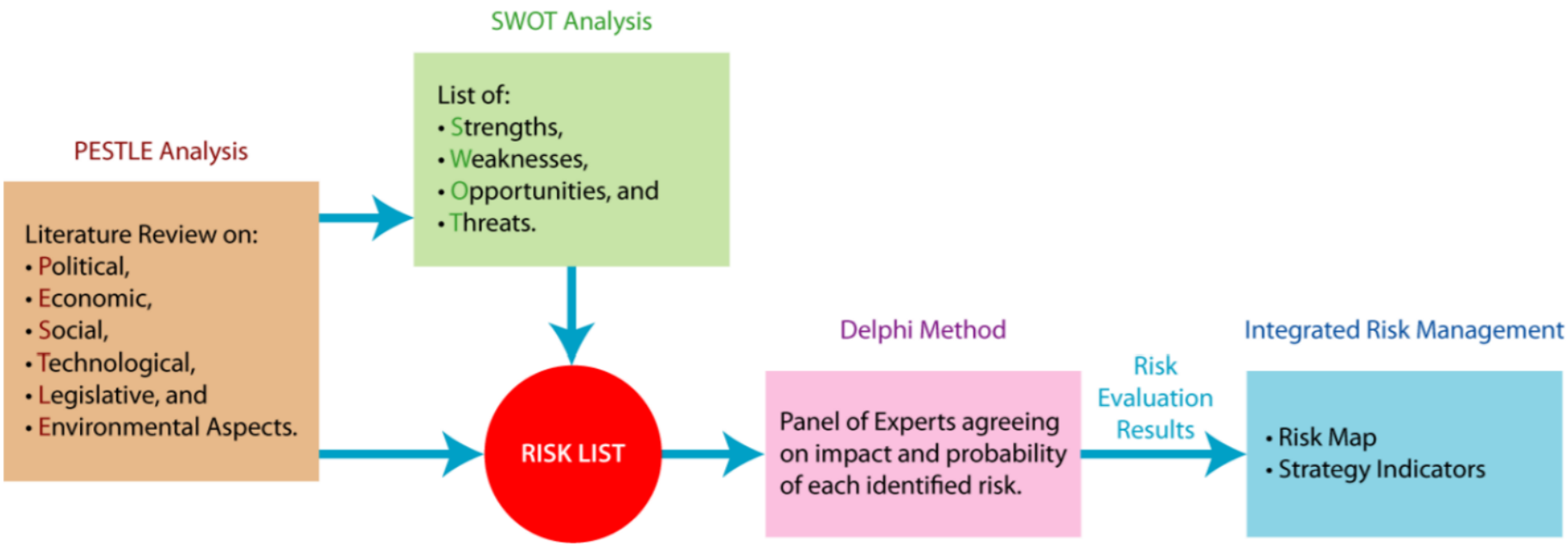
- Financira Hrvatska zaklada za znanost
- Budžet 748 tisuća kn
- Pridruženi partneri:
  - Sveučilište Aalborg
  - HEP Operator distribucijskog sustava
  - Ekonomski fakultet, Zagreb
- Listopad 2015 – rujan 2018

Istraživanje u području EV

- Koncept stanica za zamjenu baterija kao jedna od alternativa infrastrukture EV,
- Dostupna infrastruktura za punjenje EV -> kritičan cilj! Ili?
- Pitanja koja su usmjerila istraživanje:
  - Strateška/politička -> koji su ciljevi?
  - Ekonomska -> što je isplativo?
  - Sociološka -> što ljudi žele?
  - Tehnička -> koje su tehničke mogućnosti i ograničenja?
  - Pravna -> koje su regulatorne prepreke?
  - Okolišna -> koje su okolišne prednosti EV i u kojim uvjetima?

Metoda IRM

- Metoda integriranog upravljanja rizicima -> dubinska analiza više aspekata koji utječu na projekt/poslovni slučaj,
- Sve više prisutna u kreiranju poslovanja, posebno nakon zadnje ekonomske krize.

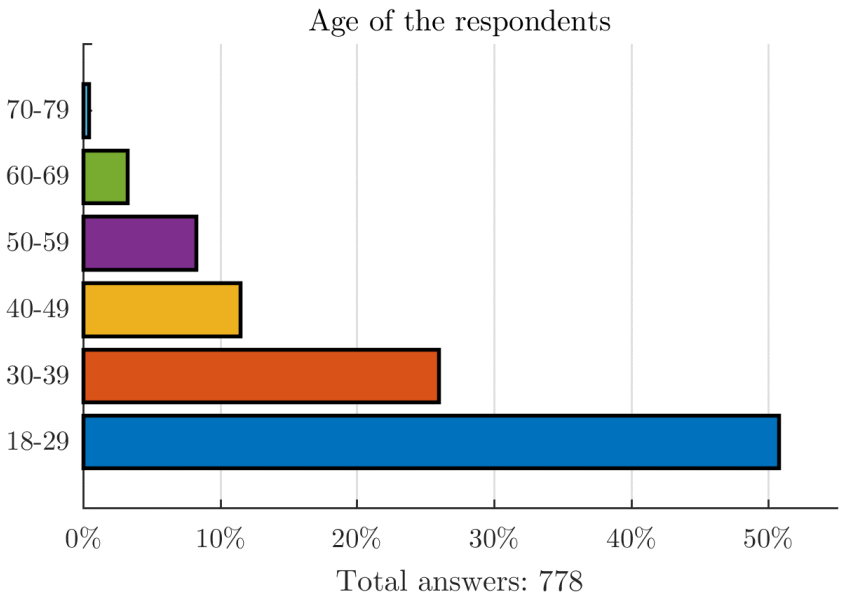


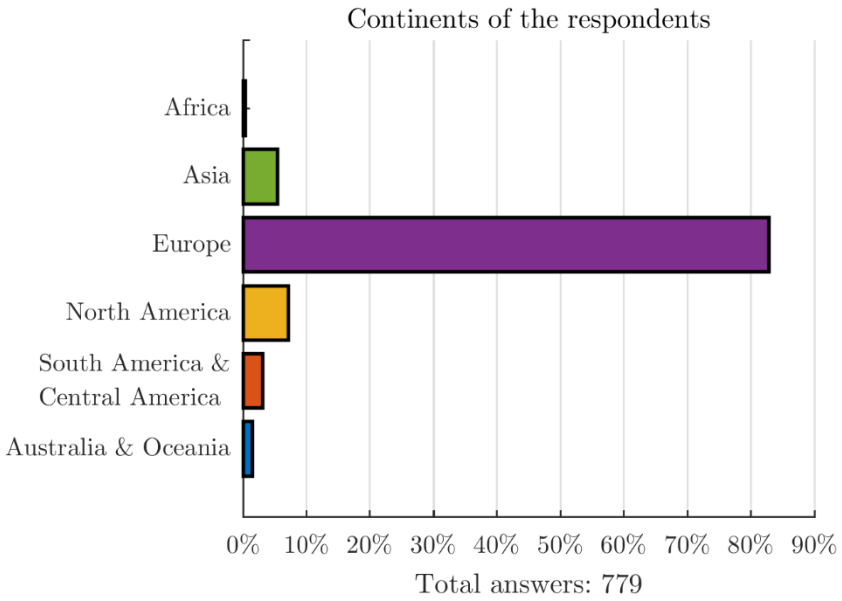
PESTLE analiza

- Pregledano preko 250 znanstvenih članaka, izvještaja i studija,
- Analizirano i uspoređeno s više stotina „novinarskih” izvora podataka (teško je ustvrditi objektivnost i relevantnost podataka, nema recenzijskog postupka),
- Pregledano više desetaka europskih projekata,
- Razgovori sa stručnjacima, zaljubljenicima, „običnim” ljudima, provedena anketa.

PESTLE ANALIZA

Anketa o EV i stanicama za zamjenu baterija





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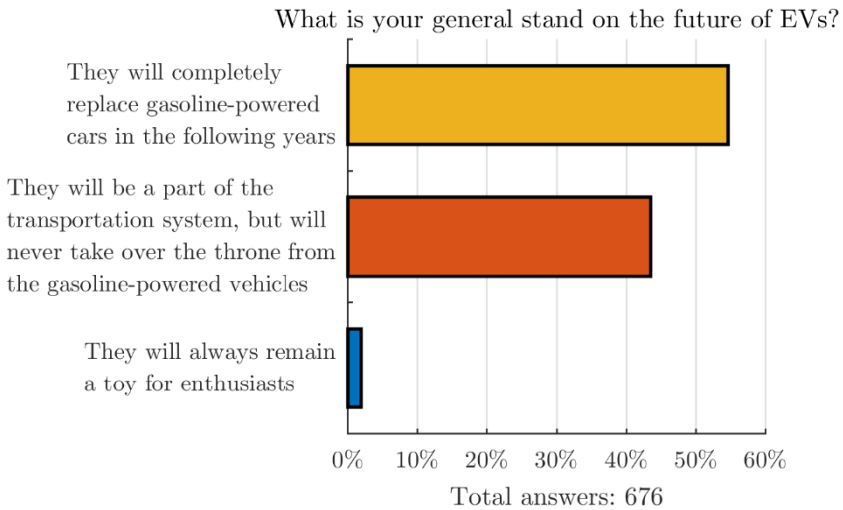

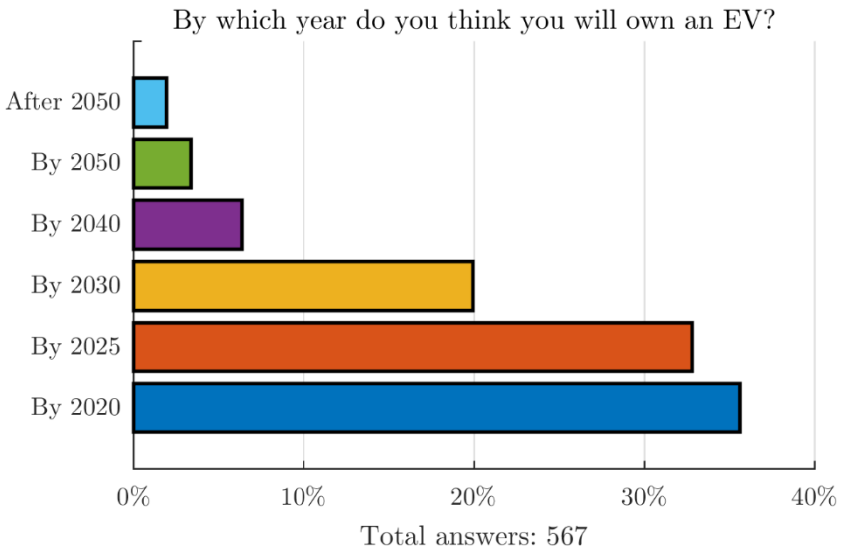

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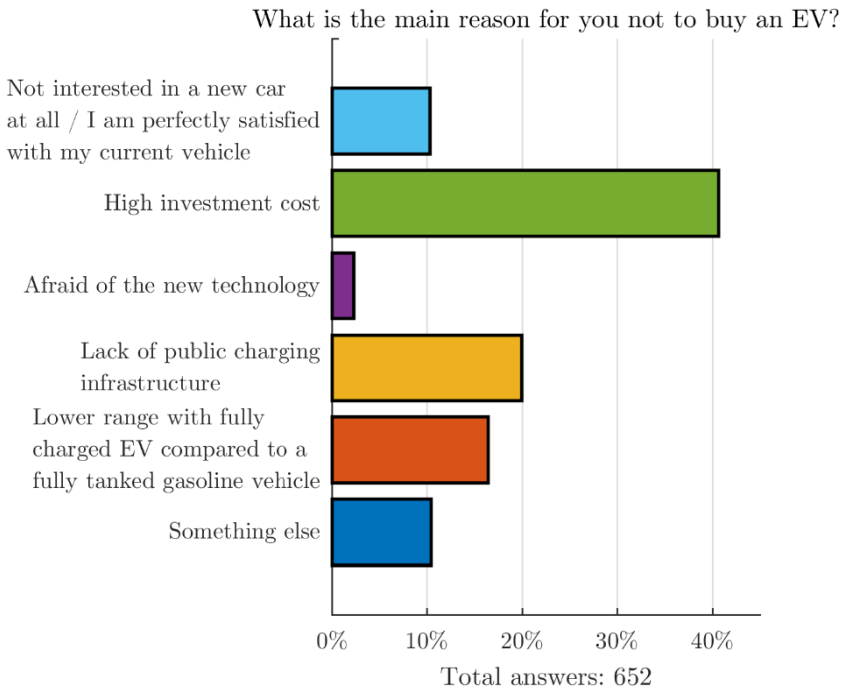

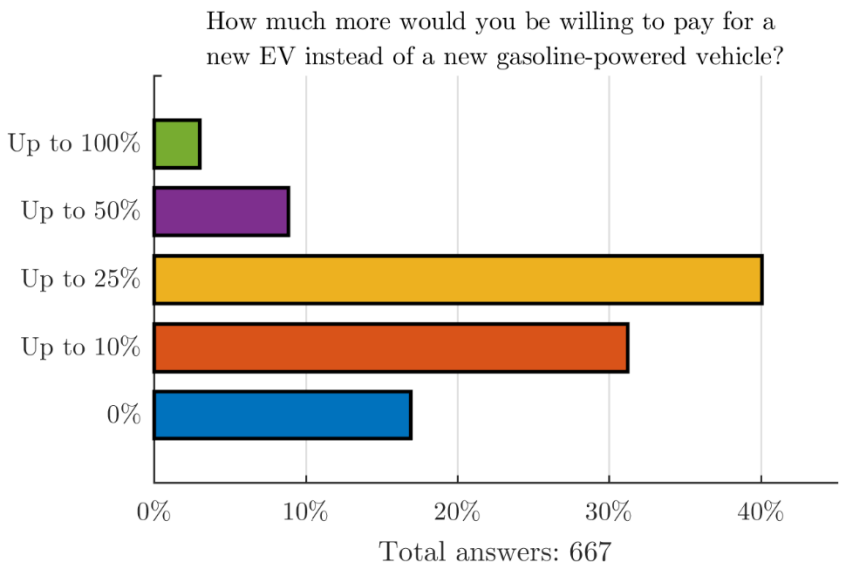

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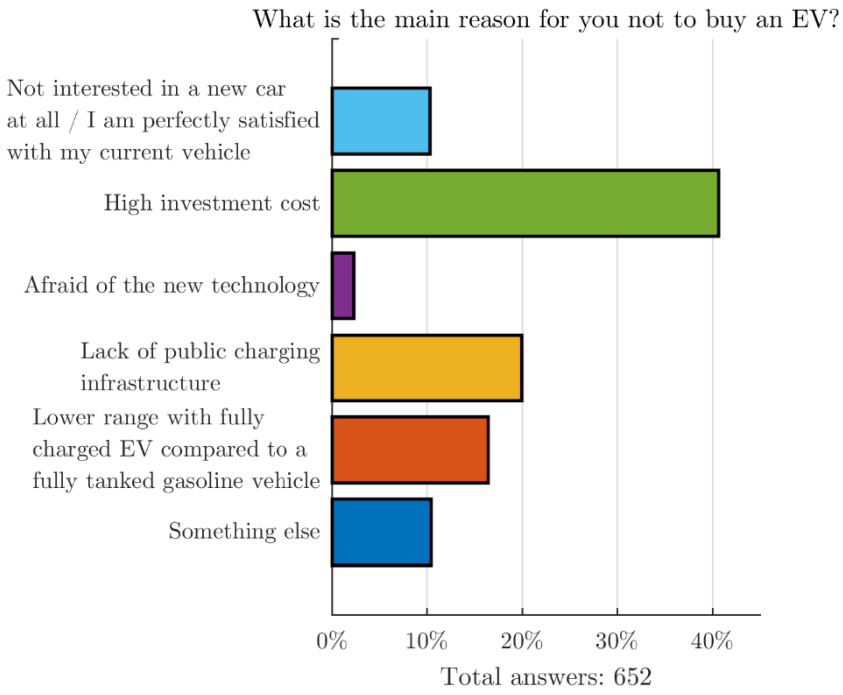

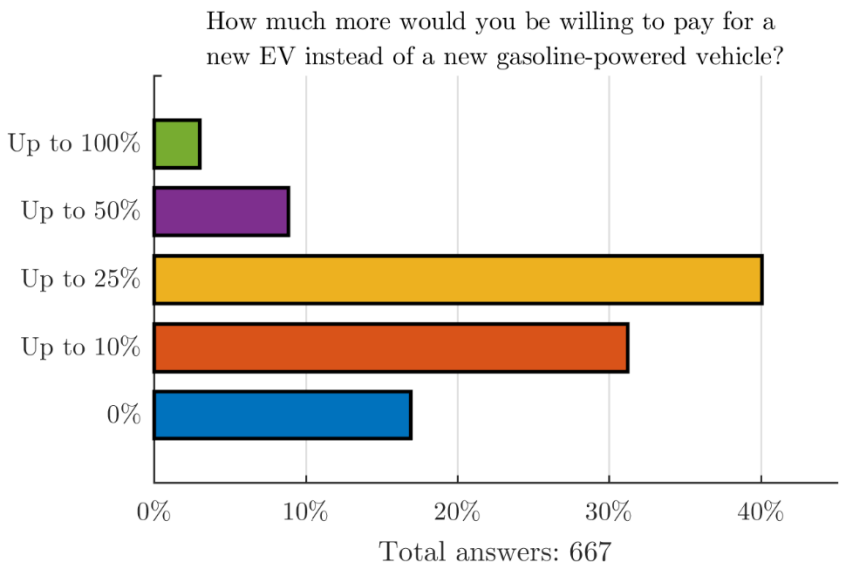

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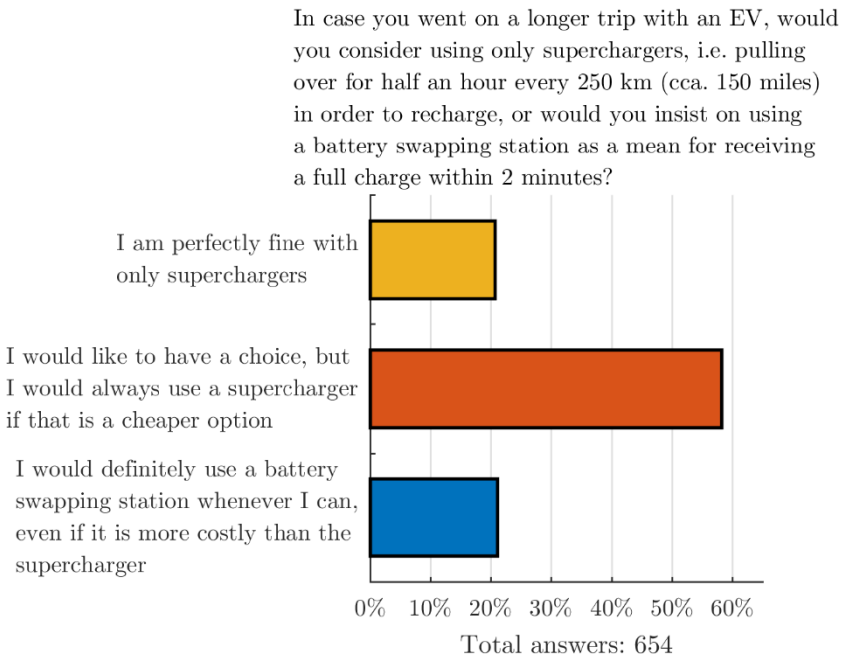

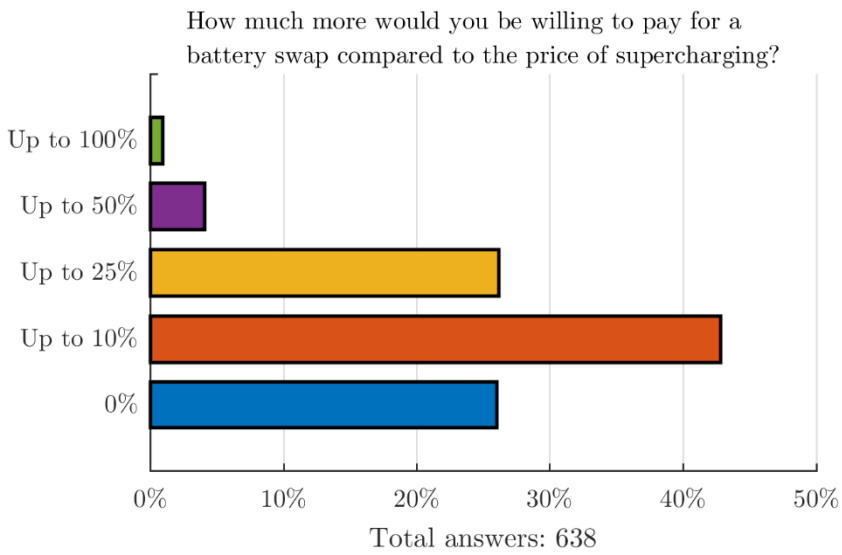

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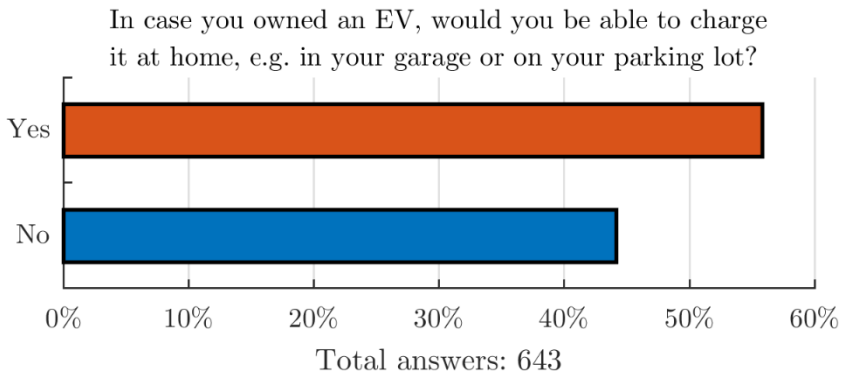

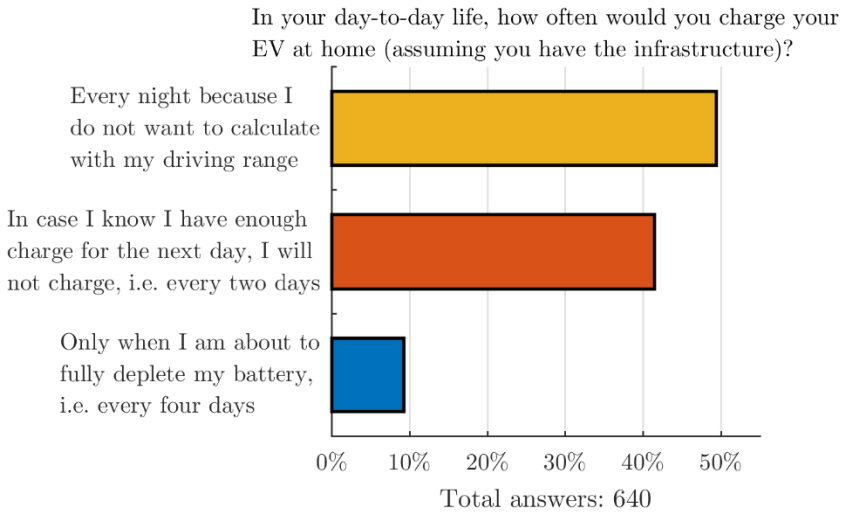

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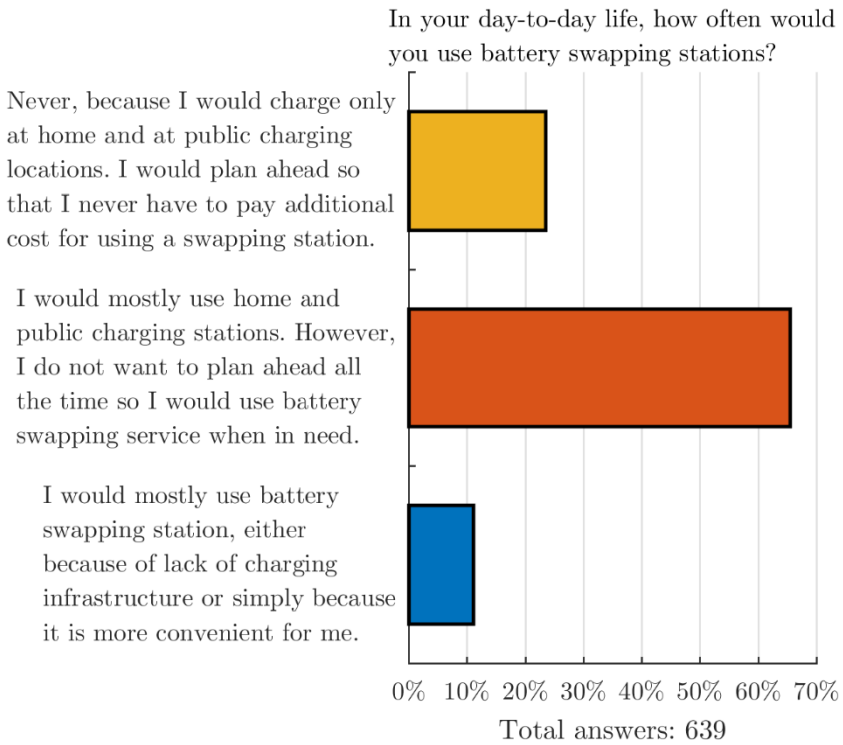
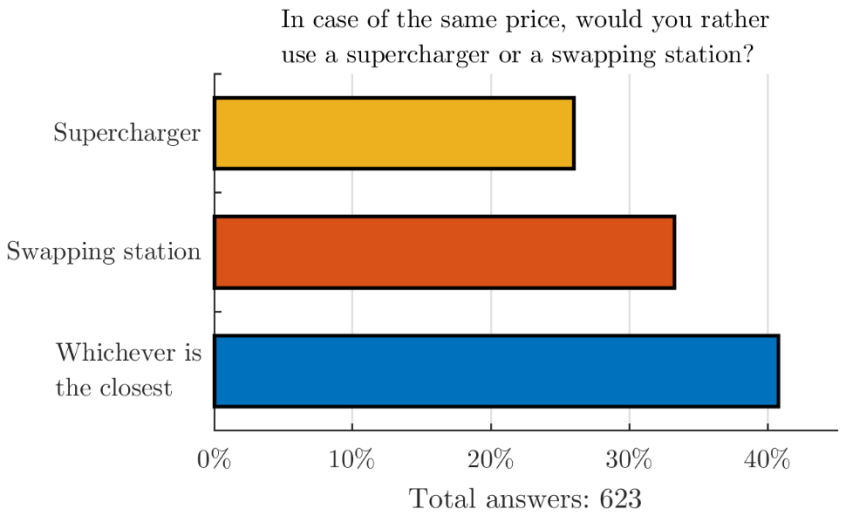




PESTLE analiza

- Politički aspekti/rizici:
  - Jasno definirane EU energetske strategije (2030. s pogledom na 2050.) -> znatno povećanje učinkovitosti transportnog sustava, smanjenje utjecaja na okoliš.
  - Jasno definirane nacionalne strategije -> primjeri Danske (do 2050. bez fosilnih goriva u energetici i transportu) i Njemačke (zabrana prometa dizel vozila i određenim gradovima, jasni ciljevi prelaska na elektrificirani promet).
  - Nepostojanje strategije za EV izuzetak, a ne pravilo.
  - Alternativa -> vodik?

PESTLE analiza

- Ekonomski aspekti/rizici:
  - Ukupna cijena vlasništva EV (ne samo inicijalni trošak) -> no sociološki aspekt veće inicijalne cijene određuje kupnju,
  - Cjenovne prednosti u sustavima s visokim udjelom OIE -> upravljivost kao faktor nižeg troška („jeftino punjenje”)
  - Cijena baterija u budućnosti u padu (cijena kod nekih EV proizvođača već oko 150$/kWh),
  - V2G potencijali,
  - Infrastruktura za EV -> kakve, gdje, koliko? U ovom trenutku nedostatna.

PESTLE analiza

- Sociološka prihvatljivost:
  - Skepsa ljudi prema novim tehnologijama,
  - Kupac ne bira novu tehnologiju osim ako nije barem iste kvalitete/ranga kao postojeća,
  - Nedovoljna educiranost (postojanje poticaja, porezne olakšice, poznavanje tehnologije),
  - Nedovoljan domet? -> više od 95% vozača bi bez problema ispunilo svoje dnevne potrebe samo puneći EV noću.
  - Dojam nedovoljnog broja modela -> obiteljski EV!
  - Strah od požara, kvara, neadekvatne infrastrukture za održavanje EV -> opravdanost?

PESTLE analiza

- Tehnološki izazovi:
  - Postizanje veće energetske gustoće li-ion baterija -> napredak, ali…
  - Degradacija baterija (kolika, nakon koliko kilometara…) -> povezano sa sociološki aspektima (skeptičnost kupaca),
  - Infrastruktura za EV:
    - sustav preferira mogućnost upravljivog tereta (fleksibilni EES).
    - Kupac preferira što brže punjenje na brzo dostupnoj lokaciji.
    - V2G infrastruktura?

PESTLE analiza

- Regulatorni aspekti i poticaji :
  - Analiza poticaja i učinkovitosti istih u 18 država svijeta,
  - Izravni poticaji (jednokratni) ili npr. porezne olakšice (i brojni drugi oblici).
  - Vlasništvo, upravljanje… regulatorni aspekti nedorečeni (primjerice opskrbljivača, operatora sustava, agregatora…)
- Okolišni utjecaji:
  - Smanjenje globalnih (danas oko 23%) i lokalnih emisija čestica (čestice kratkog dometa, značajno onečišćenje u gradovima), kao i buke (javni prijevoz noću),
  - Aspekti recikliranja baterija.

SWOT analiza

Strengths	Weaknesses
Safety aspects of EVs are at least as good as that of ICE vehicles	Diversity of EV models (from initial need for standard models to larger model diversity in the future)
Interaction with DSO (coordinated operation with variable and uncertain sources, such as RES)	Potential buyers not aware of the incentives and tax reductions or these do not adequately compensate for new technology - cost savings skepticism
Engine efficiency	High initial cost of EV
Global and local emission impact	Cost of charging infrastructure
Noise pollution reduction	Cost of batteries
	Battery degradation
	Range-anxiety, lower EV range than of CV
	Education and income (limiting the potential EV market)
	Long charging periods (slow chargers at home)
	Standardization of chargers
	Development and standardization of batteries

SWOT analiza

Opportunities	Threats
EU Strategies are promoting EVs	Global financial crisis affects purchase power
EV are reducing fossil fuel dependency	Additional investments into electric grid infrastructure
Integration of EV reduces energy needs	
Integration of EVs supports a strategic goal of CO_2 emissions reduction	
EV as a way of increasing transportation efficiency	
EV as a flexibility tool, increasing the share of RES	
Business case for aggregators	
Lower operation and maintenance cost than of ICE vehicles	
Financial incentives for buying EV	
Corporate social responsibility	

Koraci IRM analize

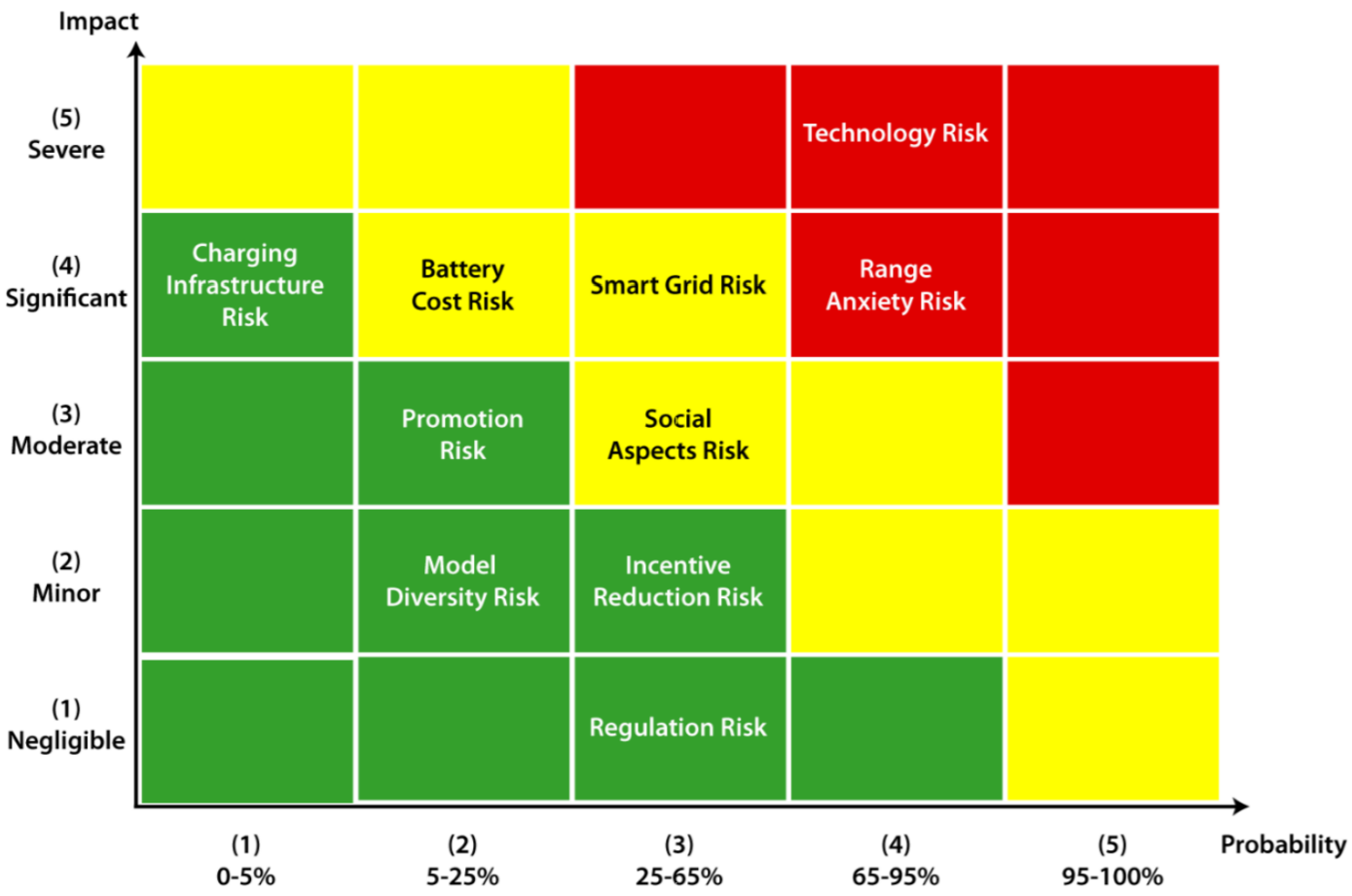
- Definiranje ciljeva analize:
  - Postizanja najmanje 15% integracije EV u idućih 5 godina.
- Analiza vanjskih i unutarnjih čimbenika:
  - PESTLE -> SWOT.
- Identifikacija rizika
  - Definiranje ključnih događaja s mogućim značajnim utjecajem na ostvarenje cilja.
- Procjena rizika
  - Utjecaj/upliv i vjerojatnost

Koraci IRM analize

- Mapiranje rizika:
  - „šira slika”,
  - i) moguće je upravljanje, b) treba ih nadzirati, and c) mogu biti ignorirani
- Upravljanje rizicima:
  - Izbjegavanje, premještanje, prenošenje, prihvaćanje.
- Konstantno praćenje i prilagođavanje strategija

Type of risk	Description/explanation
Technology	The battery technology is not developing according to the expectations and needs for a large EV uptake (energy density, number of charging cycles, battery degradation, and standardization).
Range anxiety	Scepticism/unhappiness of final consumers since the EV range is still not equivalent to the one of CV (social aspect, expectations).
Incentives reduction	Federal and local incentives for buying EVs will be reduced (or recalled entirely) before reaching the critical mass.
Promotion	Potential buyers not aware of the incentives and tax reductions. Or the rebates/tax reductions do not adequately compensate for the cost of new technology and do not provide sufficient (initial) cost savings compared to CV.
Smart Grid	The investment in smart infrastructure that supports EV charging will be too high, stopping the integration of EV/charging points (grid, sources of flexibility compensating variability and uncertainty of RES and of EV).
Regulation	Regulation for active participation of EVs in electricity markets will take a very long time to set up (local level market is non-existent).
Charging infrastructure	Insufficient development of charging infrastructure: not enough public charging points, slow charging, expensive service.
Social aspects	EV potential/market recognized by only higher education and high income buyers, limiting further uptake/integration.
Model diversity	Initial demand for model standardization should be substituted with sufficient number of different models serving different needs and demands of potential consumers. This implies developing different "types" of EV – from small city cars, standard middle class cars to caravans, SUVs, larger family cars and sport EVs.
Battery cost	Current obstacle for reduction of EV costs and having acceptable costs for final customers is high initial investment cost of batteries. This should be differentiated from the technology risk as technology development is not necessarily followed by reduction in production/sales costs.

Mapa rizika


Impact
(5) Severe
(4) Significant
(3) Moderate
(2) Minor
(1) Negligible
Technology Risk
Charging Infrastructure Risk
Battery Cost Risk
Smart Grid Risk
Range Anxiety Risk
Promotion Risk
Social Aspects Risk
Model Diversity Risk
Incentive Reduction Risk
Regulation Risk
(1) 0-5%
(2) 5-25%
(3) 25-65%
(4) 65-95%
(5) 95-100%
Probability

Smjernice istraživanja za EVBASS

- Ekonomski modeli:
  - Optimalno punjenje, profita za krajnje korisnike, novi poslovni modeli privlačni krajnjem korisniku,
  - Ekonomija „dijeljenja”.
- Tehnički aspekti:
  - Baterije: ponašanje, modeliranje, degradacija….
- Regulatorni aspekti
  - Analiza postojeće regulative, prijedlozi promjena…