

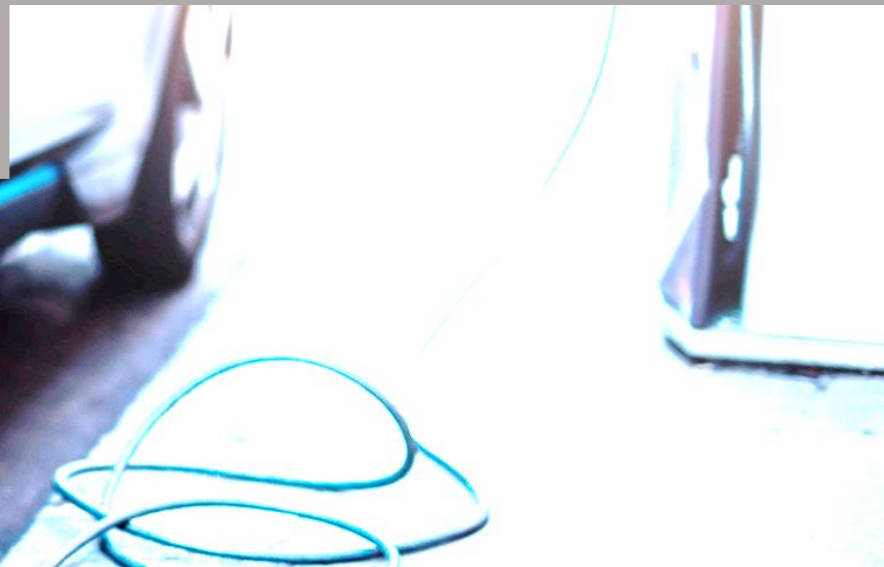


Understanding barriers to electric vehicle adoption for personal mobility: A case study of middle-income in-service residents in Hyderabad city, India

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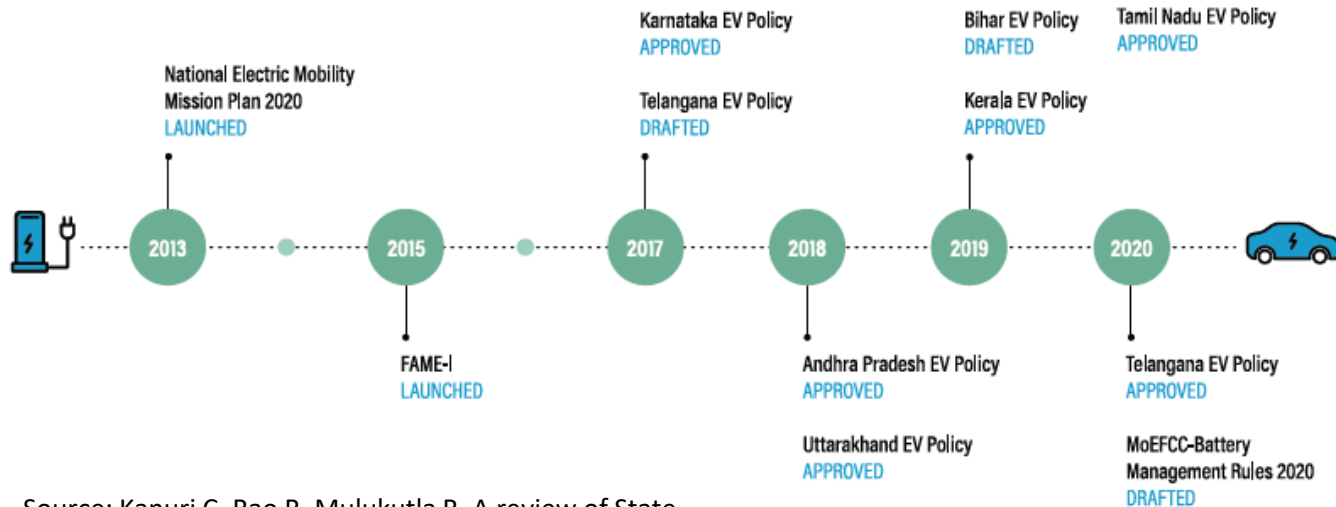
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Background: India

Enabling state level policies



Source: Kanuri C, Rao R, Mulukutla R, A review of State Government Policies for Electric Mobility, WRI ROSS Centre



Background India

- Despite relatively strong policy support for EVs the achievement in terms of vehicles sold and market share is very poor.
- The total electric vehicles sold in India was around 0.76 million in 2019–20, of which 83% were three-wheelers and 16.4% two-wheelers. Electric cars have not made much headway, with just 3400 sold in 2019–20. This accounts for around 1% of the total automobile market.

Starting hypothesis



H1: Low awareness (poor understanding of fuel and maintenance costs) reduce the propensity to buy EVs

H2: Inferior performance (in terms of driving range, reliability, battery life and safety) relative to conventional vehicles reduces the propensity to buy EVs

H3: Better charging infrastructure increases the propensity to buy EVs

H4: High purchase costs (vehicle + battery costs) reduce the propensity to buy EVs

This study focuses on battery electric vehicles (BEVs) since India's financial incentives are related to the size of the battery.

Methods

Consumer Survey

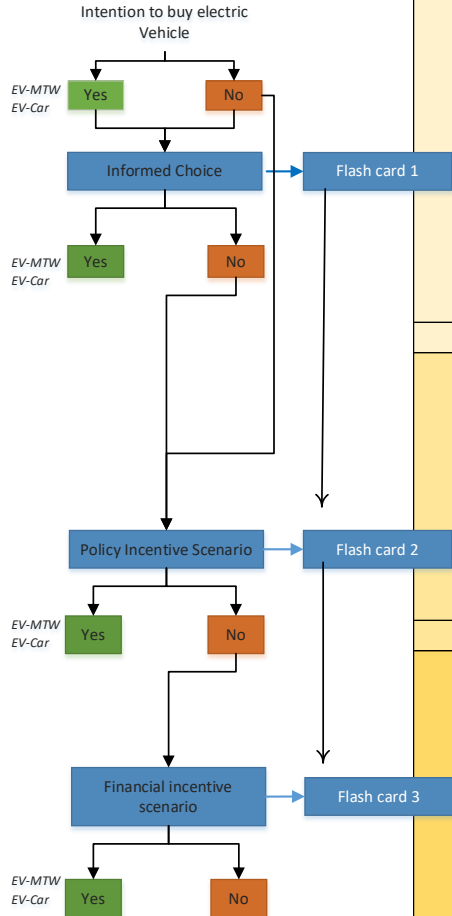


The city of Hyderabad in India was taken as a case to understand the barriers faced by E.V.s.

To find out what interventions are needed, a survey of prospective users of E.V.s in Hyderabad was conducted during June - Sep 2017.

Stated preference survey method was used, and alternative scenarios of E.V. infrastructure, E.V. vehicle technology and policy were presented to the respondents using flashcards.

Choice Survey



		Car (4- Wheeler Hatchback)		MTW (2-Wheeler)	
Product	Fuel	Conventional	Electric	Conventional	Electric
	Mileage/Range	17.2 kmpl	170 km on full ch'g	43 kmpl	60 km on full ch'g
	Power	1200 cc/104 hp	1717 cc/107 hp	102 cc / 6.91 hp	100 cc / 6.71 hp
	Max Speed	140 kmph	149 kmph	77 kmph	60 kmph
	Charging Time	0	Normal Ch'g -6 hr Quick Ch'g - 1 hr	None	Normal Ch'g- 7 hr Quick Ch'g -2.5 hr
Price(INR)	Purchase Price	13.40 Lacs	22.08 Lacs	0.66 Lacs	1.00 Lacs
	Govt. Subsidy	0	1.90 lacs	0	0.22 Lacs
	All Inclusive Ownership Cost	20.64/km	26.42/km	3.09/km	2.52/km
		Intention to purchase EV: Yes/No		Intention to purchase EV: Yes/No	
Supporting Infrastructure	Infrastructure	None	No parking fees Priority parking	None	No parking fees Priority Parking
	Congestion	None	Priority driving lanes	None	Priority driving lanes
	Tolls	As usual	No Tolls	As usual	No Tolls
	Public Transport	None	Free pass to use public transport	None	Free pass to use public transport
	Charging Infrastructure	n/a	Setup quick ch'g at home	N/A	Setup Quick ch'g point at home
Finance(INR)		Intention to purchase EV: Yes/No		Intention to purchase EV: Yes/No	
	Financing (10 yrs)	Regular rate @ 8%	Lower rate @ 5%	Regular rate @ 8%	Low rate @ 5%
	GST	29%	12%	0.29	0.12
	Road Tax	12%	No road tax	0.12	No road tax
	Revised Vehicle Price	13.4 Lacs	17.12 Lacs	66 K	78.4 K
	Revised Ownership Cost	20.64/km	17.78/km	3.09/km	1.77/km
	Income Tax Benefits	None	Yes (up to 25000)		
		Intention to purchase EV: Yes/No		Intention to purchase EV: Yes/No	

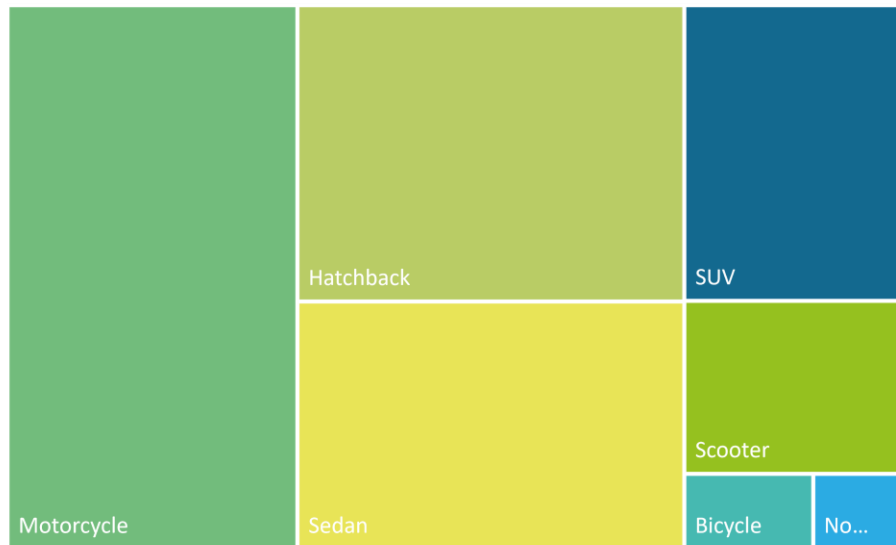
Survey details

Variable		Andra Pradesh	India	Count	%	Chi-Square	Count	%	Chi-Square	Count	%
				Car Choice Set			MTW Choice Set			All Data	
	n	Urban Areas		458			748			1206	
Marital status	Have kids	74%	74%	193	42%	23.9	209	28%	218.9	402	33%
	Married			100	22%		167	22%		267	22%
	Single	26%	26%	165	36%		372	50%		537	45%
Gender	Female	50%	48%	114	25%	115.5	207	28%	149.1	321	27%
	Male	50%	52%	344	75%		541	72%		885	73%
Age	18-30	41%	40%	195	43%	7.0*	443	59%	110.1	638	53%
	30-40	29%	29%	149	32%		178	24%		327	27%
	40-50	20%	21%	81	18%		88	12%		169	14%
	50+	10%	10%	33	7%		39	5%		72	6%

Vehicle Ownership

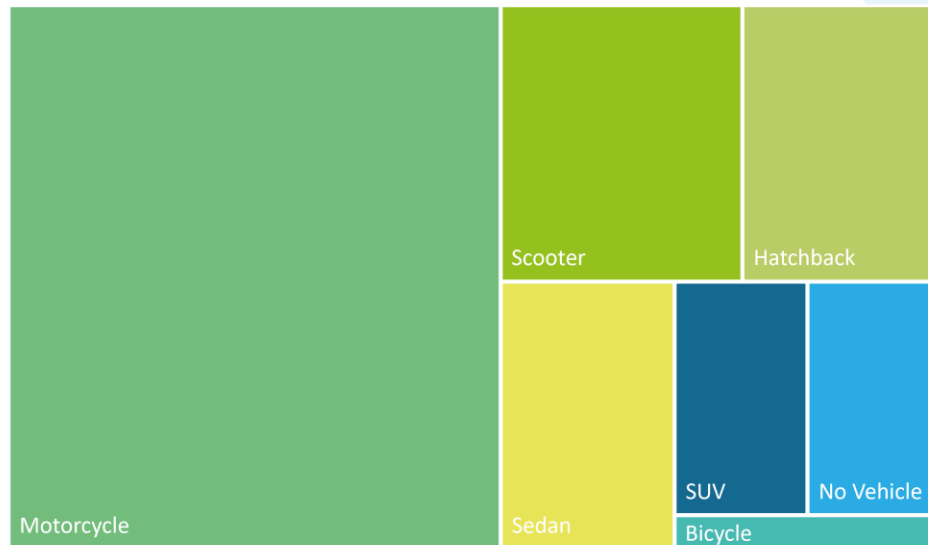
Car Choice Set (458)

■ No Vehicle ■ Bicycle ■ Motorcycle ■ Scooter
■ Hatchback ■ Sedan ■ SUV



Scooter Choice Set (748)

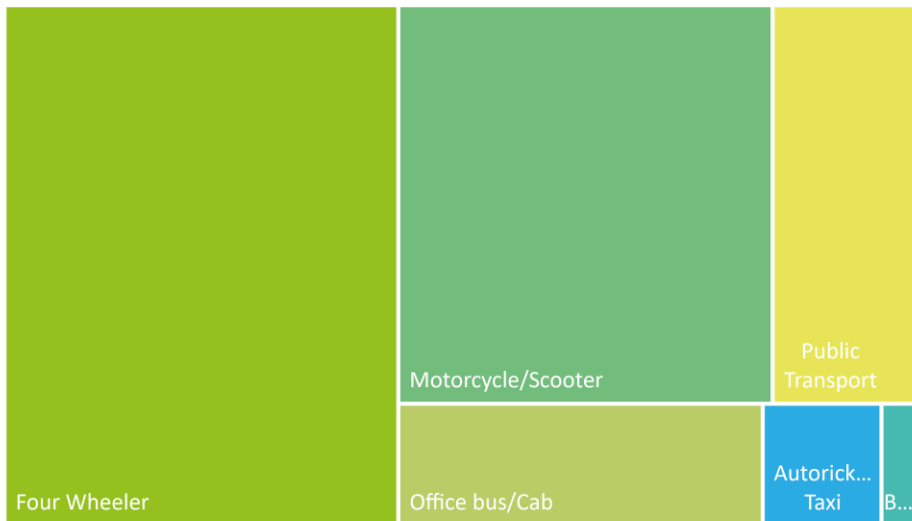
■ No Vehicle ■ Bicycle ■ Motorcycle ■ Scooter
■ Hatchback ■ Sedan ■ SUV



Vehicle used for regular travel

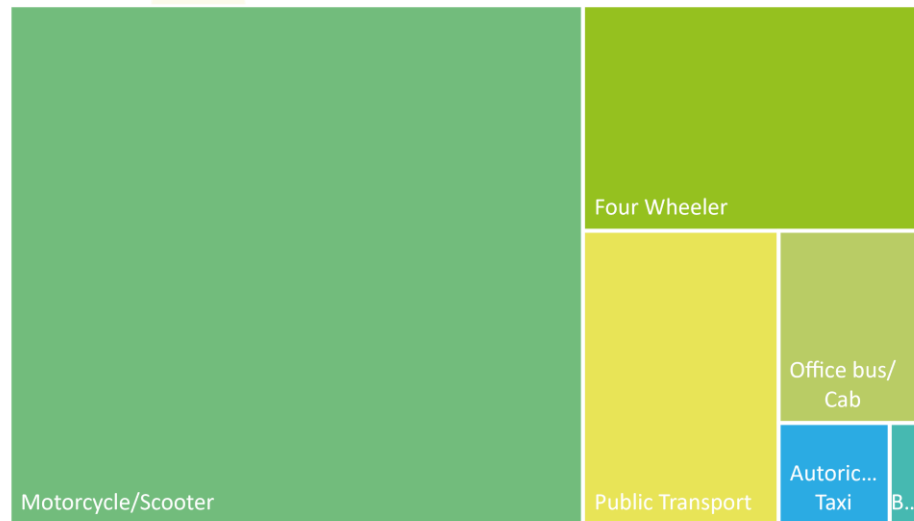
Car Choice Set

- Autorickshaw/Taxi
- Bicycle
- Motorcycle/Scooter
- Four Wheeler
- Office bus/Cab
- Public Transport



Scooter Choice Set

- Autorickshaw/Taxi
- Bicycle
- Motorcycle/Scooter
- Four Wheeler
- Office bus/Cab
- Public Transport



Awareness

No of Auto Manufacturers Know-Car Choice Set

■ None ■ Up to five ■ More than five



No of Auto Manufacturers Know-Scooter Choice Set

■ None ■ Up to five ■ More than five



No of e-Auto Manufacturers Know-Car Choice Set

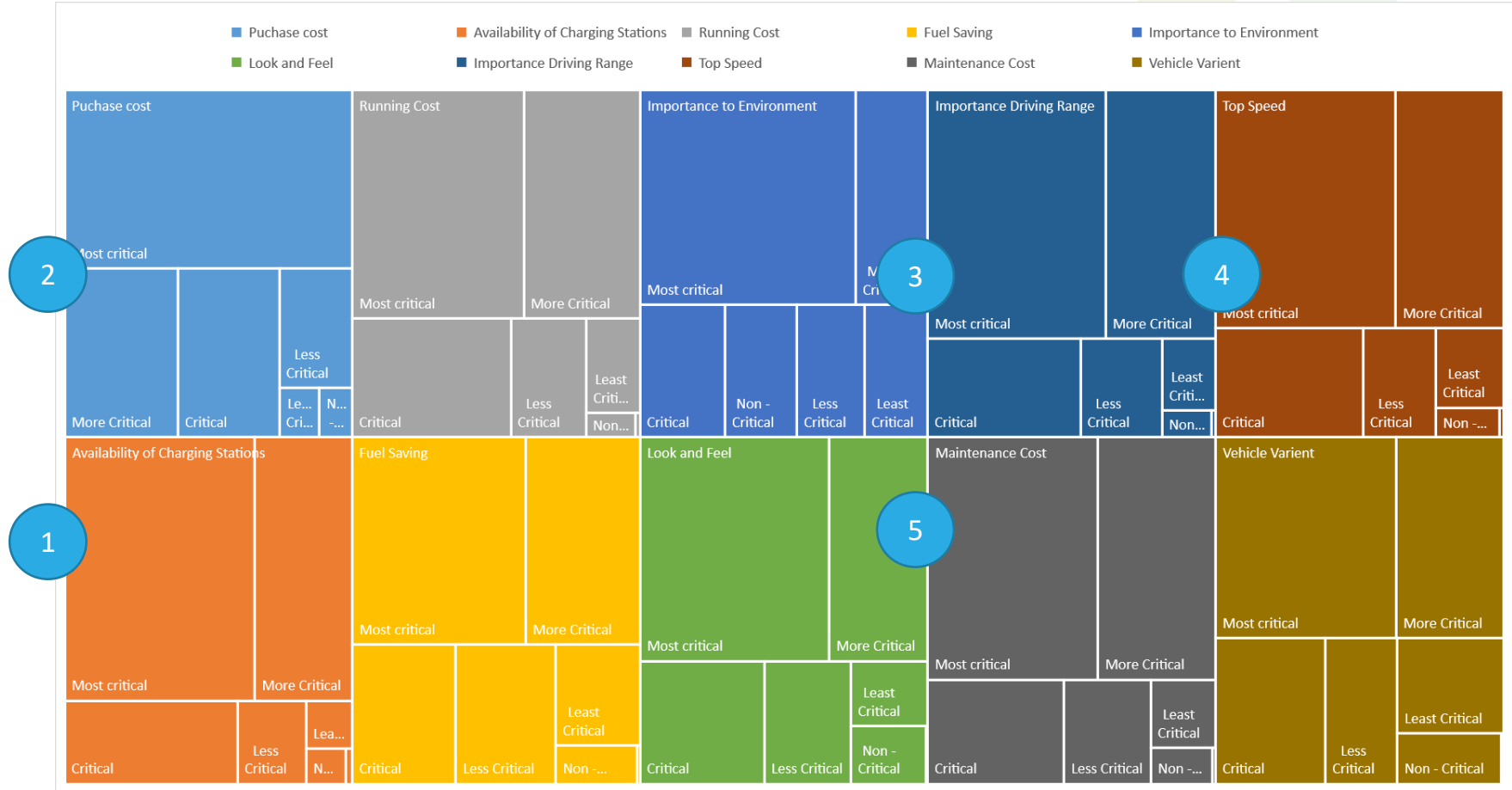
■ None ■ One ■ More than One



No of e-Auto Manufacturers Know-Scooter Choice Set

■ None ■ One ■ More than One



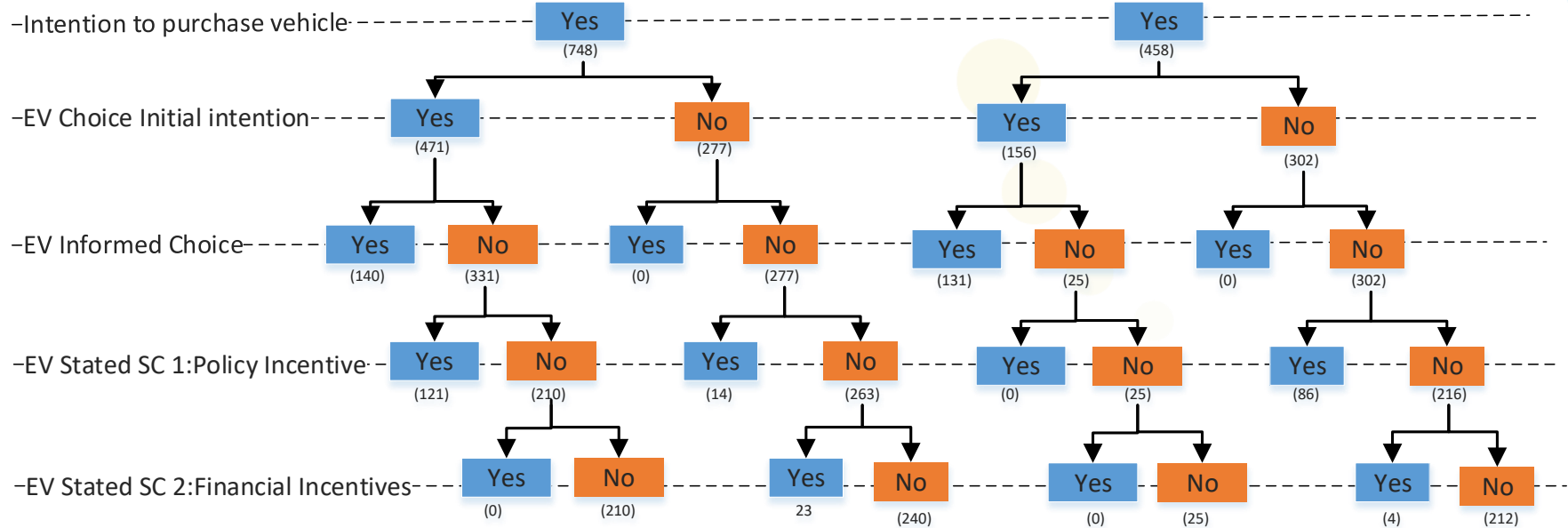


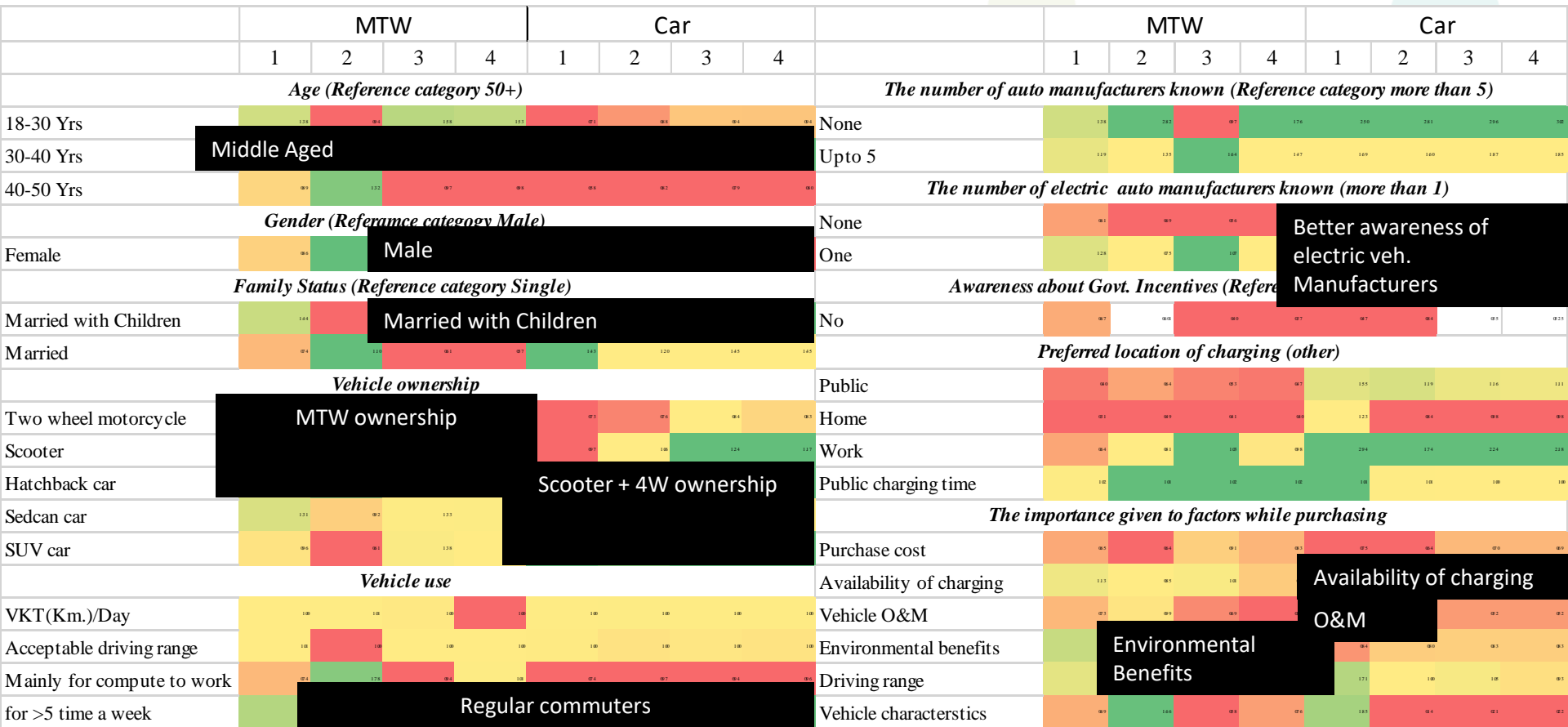
Results



Motorised Two Wheelers

Cars



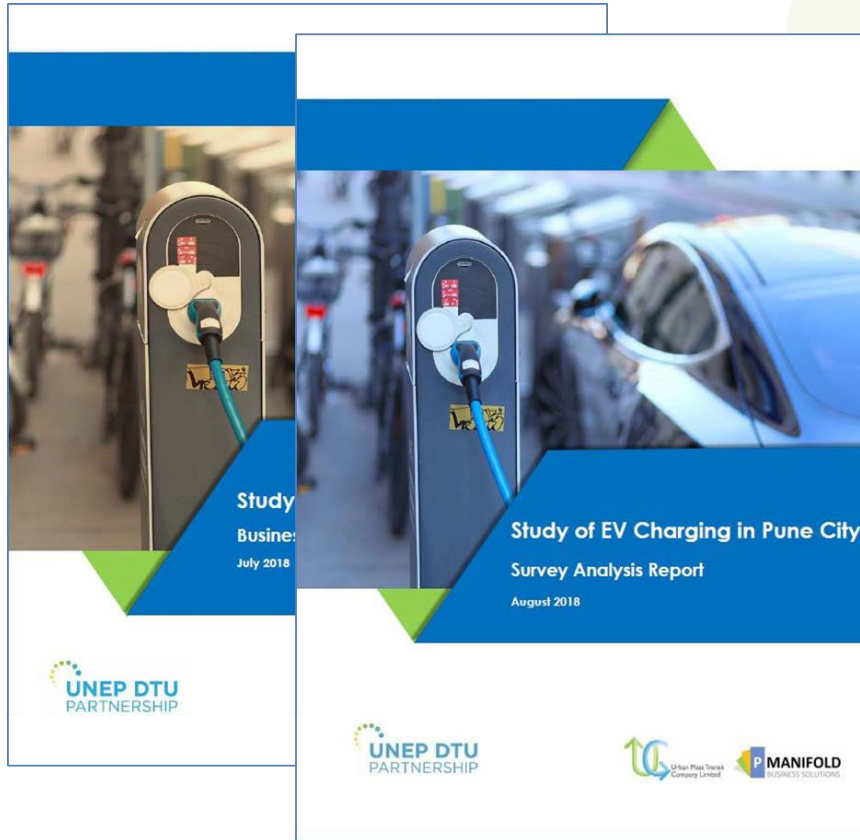


Informed choice

- Among the respondents, the early adopters of EV-MTW were **middle-aged (30-40 years and 40-50 years)** (compared to old), **females, married, and individuals who commute daily using a vehicle and own private MTW.**
- In the informed scenario, **the old and the middle-aged (30-40 years), females, and married families with children are most like to choose EV-Cars.**
- Unlike initial choice, when facts are known, respondents who were more concerned about purchase cost, charging infrastructure, maintenance and driving range (for both EV-MTW and EV-Car), were less like to purchase EV. As the incentives given under FAME -1 were part of the informed scenario, the cost difference was noticeable. When purchasing a new vehicle, the early adopters of EVs also critically consider environmental benefits and vehicle characteristics like the look and feel, top speed, *etc.*

Results EV Car Choice





Thank You