Micro-case №2

LOVE-HATE relationship with electronic scooters

Scooter Transportation Management Concept

Our Team











Executive Summary

Key task: Produce Scooter Transportation Management Concept, that can be implemented by municipalities of Yerevan.

Suggested concept:
-Patrol regulation
-Campaign
-Infrastructure
-Fines
-App functionalities

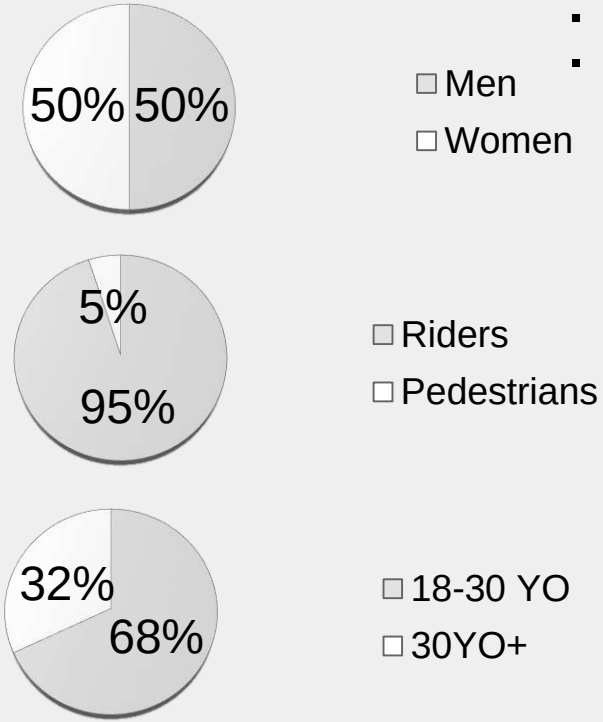
Impact:

- Specified regulatory developments aiming at involving patrols in e scooter traffic supervision processes and creating specific fines for reckless behavior
- More aware people about poor e scooter management consequences
- Improved infrastructure
- Technical developments towards security improvements

Local analysis

Data was provided by Heratsi 1 hospital. It can be considered as a representative sample for whole accidents happened in Yerevan from March 2022 to June 2022.

- Total number of cases - *38 registered cases*;
- Causes of accidents - lose of control when getting close to obstacles or other vehicles, riding e-scooter by 2 or 3 people;
- Result of the accidents happened - 24% had fractures, 76% had injuries, only 2 cases of hospitalization.



Characteristics of injured people

Global data (Hamburg 2019-2020)

37%

of E-scooter accidents occurred at night

52%

of accidents happened at the weekend

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Most accidents happen in summer

54%

of the injured e-scooter riders suffered trauma to the head or face

28%

of the persons who sustained them were under the influence of alcohol

International overview of practice

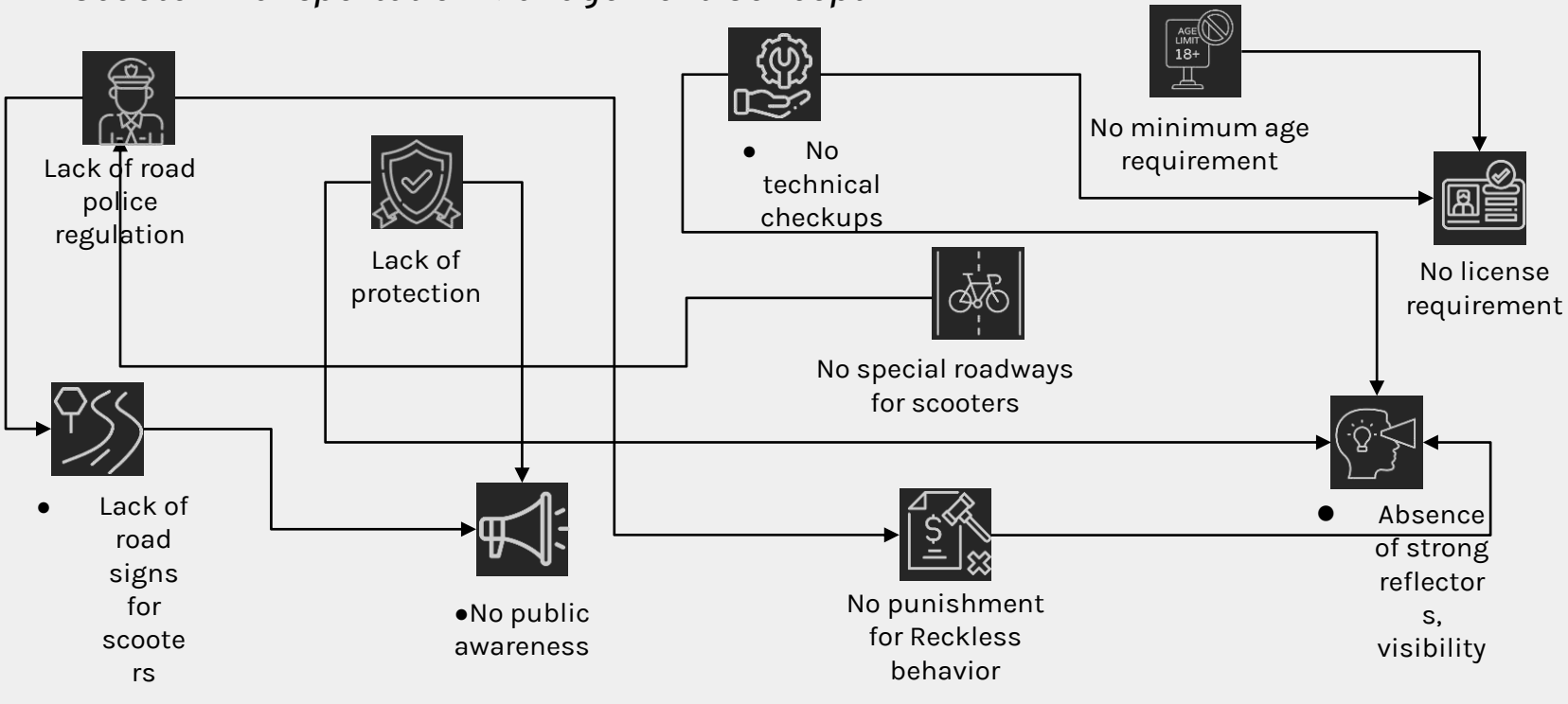
- Monaco and GB have banned e-scooters
- Most of European countries have legalized use of e-scooters

In EU countries

- scooter driving license
- 25 km/h is the maximum speed
- riding is prohibited from sidewalks (some countries allow riding on sidewalks under 6 km/h speed)
- scooters have separate roads
- wearing helmet is recommended, yet not enforced by law
- children under 16 can ride on parks and private lands
- scooters are required to have front and rear headlights, bell, brakes

Problems Chain to be created

Scooter Transportation Management Concept



Strategy and Tactics

Strategy:

Maximizing security of e-scooter riders and community.

Tactics:

- Legislative
- Infrastructural
- Behavioral
- Technical

Problem of non-regulation

“No one rides without the rules. Neither should e-scooter riders!”

According to the policy of the main operator of e-scooters in Yerevan (Yerevan Ride);

- *E-scooters are prohibited to ride on pavements*
- *E-scooters should be ridden only on roadways*
- *E-scooter riders should necessarily possess knowledge on traffic rules*

E-scooter is not anyhow covered in the law of RA and is not considered a vehicle.

As of now use of e-scooters in Armenia is not regulated by the Law of the Republic of Armenia "On Ensuring Road Safety".

As a result it is not supervised by the Patrol Service of the Police of RA, which was launched to ensure public safety touring both pedestrian groups and cars, as well as regulating the traffic in Yerevan at peak hours.

Legislative change will be the starting point of integrating e-scooters in city traffic.

It will declare the rules of using e-scooter on roads and the responsible authority for supervision (Patrol Service) will ensure e-scooters are used in ways, which are safe to public.

According to regulation:

- Rental e-scooters should be allowed on roads and cycle lanes, but be banned from pavements either allowed with strict restrictions;
- E-scooters will be limited to a maximum speed of 12.5 mph (20 km/h), they will automatically reduce speed to 8mph (13 km/h) in '**go slow**' areas. E-scooters will also come to a safe stop in '**no-go**' zones to ensure they can be ridden safely;
- Riders should wear helmets, but they will not be mandatory;
- Privately-owned e-scooters will be illegal;
- Riders will need a full or provisional car, motorcycle or moped licence to use the devices, and they must be aged 16 or over. (Age requirement is implemented because e-scooters can be dangerous for children. Children might use them for fun and drive recklessly, which will endanger both their and citizens' safety.)
- Riders will face fines and points on their licence if they use them improperly (currently a similar system is implemented for cars in Armenia);

INSURANCE -what it does for business?

E-scooters are mostly driven in crowded areas and very often hit people, causing serious injuries, or damaging someone's property. In many countries, liability insurance, just like for cars, is mandatory for scooters as well.

Making insurance mandatory for scooters requires changes in some laws, which is a long-term implementation, we suggest that the companies that will be engaged in providing scooters' rental, license their activities and make liability insurance one of the mandatory points of the license. The insurance contract will cover property and personal damages caused to third parties.

The annual insurance premium for one scooter will be **1500-3000 AMD.**

Not following the regulation?- Fines

Fining is a widespread regulation enforcing measure when it comes to transportation means. When people feel the impact of their irresponsible driving on their financial state, they become more cautious when breaking the enforced rules, and in the long run, their reckless driving behavior changes. Here are some fines that can be implemented: →

This **fines** are for the rider, however **for business** which operate the e-scooters fines should be imposed as well. They will be fined if a scooter with damage was available to ride, if the scooters do not have the necessary technical parts, if they do not have designated parking spots, etc.

Fines

- Failing to use to specific routes
- Reckless riding that poses danger to others' lives
- Riding or parking e-scooter on paths designated for walking or jogging
- Using an e-scooter without a permit
- Failing to commit to speed limits specified by the authority
- Taking passengers
- Failing to adhere to safety requirements
- Riding a scooter that does not meet technical requirements
- Parking in undesignated areas or in a manner that may block traffic or pose risk
- Ignoring instructions on road signs
- If rider is below 16 and without the supervision of an adult aged 18 and above
- Failing to dismount on pedestrian crossings
- Failing to report an accident that caused injuries or damages
- Riding against traffic

Legislative change: Risks and mitigations

Regulatory risk

The risk that a change in regulations or legislation will affect a security, company, or industry. Regulations can increase costs of operations, introduce legal and administrative hurdles, and sometimes even restrict a company from doing business.

Because the infrastructural change affects both public and private sector (governing body and scooter providing companies in this case) risks can arise within the both parties. Hence, we present a risk-mitigation framework by BCG presented at WEF, which is aimed at regulating such an issue.

The framework structures the various measures according to responsibility: the public sector is responsible for laying the foundations of a low-risk environment; the private sector has to manage risks efficiently based on those foundations; and both the public and private sectors are responsible for a culture of open dialogue.

The **public sector,** in particular the national government, can enhance political & regulatory stability by enacting and enforcing appropriate laws and regulation. The specific regulation of each infrastructure sector should be robust, with changes to sector rules that are as predictable as possible. In that regard, it helps to have automatic adaptation mechanisms in place

Within the framework set by the public sector, the **private sector** has to find ways of managing and mitigating the political & regulatory risk.

What will be the output?

Regulating the use of e-scooters

- This change will ensure the safety of citizens and scooter riders by defining traffic rules for e-scooters and supervising it as it is done in case of other transportation means. Imposed regulations regarding the speed limit, minimum age requirement and prohibition of scooter riding in pavements etc. will reduce the risk of accidents.

Licensing and insurance

- Licensing both businesses and drivers would make both of them to undertake some actions and close remaining gaps before starting the operations/ driving a scooter. This would partially eliminate the risk of uneducated drivers and not well operating scooters to be on the road and endanger safety of both citizens and drivers. Insurance is a post-accident regulatory measure, which does not prevent the accidents, however, makes sure that any damage caused to property and personal damages will be covered, which in a sense makes a citizen feel somewhat secure knowing that even if an accident occurs, there are means to compensate losses if any.

Fines

- Fines have a short-term impact on the financial state of the penalized, but long-term impact on improving rider's attitude and responsible behavior while driving.

Infrastructural changes

- **Prioritize city investments**
- **Attract private investments**

in *lanes* and *parking*, and other *street redesigns* to improve safety for e-scooter riders as well as other micromobility users, in partnership with e-scooter providers and community groups.

- Build scooter paths
- Build special parking spots
- Allocate road signs

On-Road paths

Image: Protected cycle lane, Auckland

Architects and city planners must rethink their perceptions of what is necessary for urban life. First of all we need **special paths** for this transportation mean.
Bicycle lanes on the sidewalk are not the solution. The combination of fast bikes with pedestrians is not only dangerous, but is also problematic at intersections shared with cars. Only paths that take up part of the road can really become a valid traffic network, and examples for those are emerging in London, Paris and other big cities.
Protected lanes are dedicated paths for people using scooters. They are physically separated from people driving and people walking, using various forms of separation including planter boxes, concrete kerbs, flex-posts, or berm space.
The increase in incidents is also caused the lack of traffic signs.

- Require **signage** where e-scooter travel, speed, or parking is restricted.

Image: Protected cycle lane, Portland

Image: Protected scooter lane , Melbourne

Image: On-road cycle lane, Auckland

Shared paths

For those who ride e-scooter for fun there may be special shared paths

Shared paths are for all users, on all kinds of mobility including people walking or on bikes, pushchairs, scooters, and more. It is important to look out for others, slow down, and pass with care.

Special parking spots

One of the biggest knocks against the scooters that have become ubiquitous in cities across the United States, Europe, and other parts of the world is how they can be parked anywhere. That inevitably leads to people leaving them in places that aren't ideal parking spots: the middle of sidewalks, streets, near doorways, blocking accessibility ramps, or up in trees. Sometimes they fall down — or are pushed. Incorrectly parked e-scooters can rightly frustrate local residents and vulnerable road users.

- Require e-scooters to be parked upright; prohibit parking of e-scooters in or in front of pedestrian crossings and loading zones
- Create specific parking locations in cities near workplaces and schools.
  - (Some cities have painted parking areas for these services onto their sidewalks, but putting the parking on the street is a much better approach. Pedestrians already have very limited space.)
- Allow the community to report inappropriately parked scooters through the relevant e-scooter provider's app so they can be quickly adjusted.

Risks and mitigations

Risks	Mitigations
Any attempt to allocate driving or parking lanes for those small vehicles will encounter great opposition from community.	The key to optimising services to local needs and responding to resident concerns is open and regular dialogue with the local community and advocacy groups, listening to their feedback and taking necessary action.
Social status/intelligence level of the driver/pedestrian	Development of the driving culture/pedestrian behavior level, development of the intelligence level (passing of IQ tests)
A rider is a creature that architects and planners hardly know.	Create a framework for collecting and analysing data to understand what makes rider behavior unsafe and causes the crashes.
The traffic of e-scooters and bicycles on the same path can interfere with each other because of e-scooter offering faster deceleration and up to two times shorter stopping distance.	Correctly calculated path width

What output it will have?

Scooter roads

- Considering e-scooters in city design and maintenance policies and providing specific operating space for e-scooters would benefit all road users and will ensure a safe transportation environment.

Special parking spots

- Parking bays could be physical docks or hubs such as those used for public bike hire schemes or brightly marked out areas that will encourage riders to park in safer areas and guide them to make the right choices when parking.

Road signs

- Properly placed road signs will help reduce accidents.

Technical changes

In-App technical measures

Auto max speed limit change based on location

Having default max speed of 20km/h
Set max speed of 13km/h on special areas

RISKS:
Risk of max speed change awareness
Suggestion: scooters to have a beep alarm if max speed changes

Add point in Guidance regarding reflectors and lights

(Make sure to check lights/ reflectors before each ride)

Weather based ride limitations

Don't allow ride in bad weather conditions
Based on real time weather data

RISKS:
Inaccurate data on weather forecast

User scoring system

Based on user behavior provide bonus points.

Rider bonus system

-

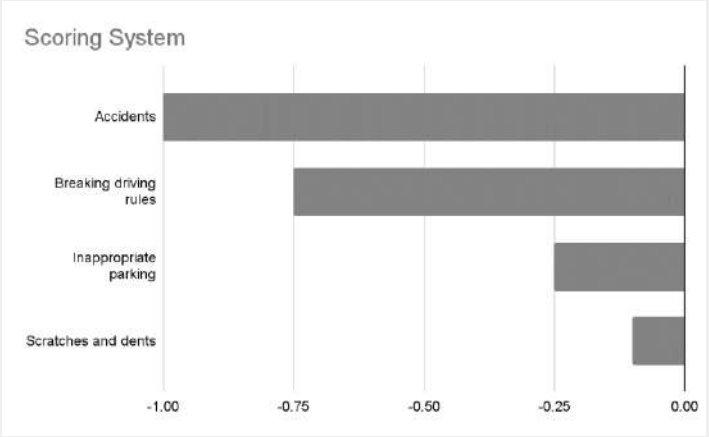
Accidents
Inappropriate parking
Scratches and dents
Breaking driving rules
Etc

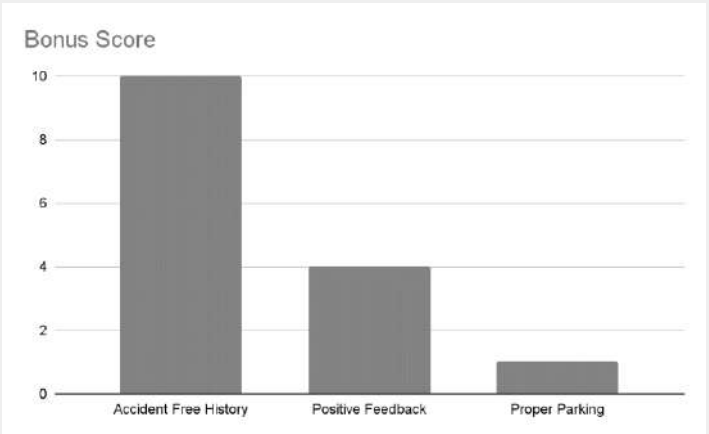
+

Parking spot rules
Accident avoidance for some period of time

Self-damage report sensors (log, data analysis)

RISKS: Inaccurate data received from the hardware





Awareness

Social media campaigns

- Via influencers
- Via Recruiting (collect like minded people)-Facebook groups, Twitter and instagram hashtags-e.g. #Safe streets for all
- Through quizzes, surveys and questions in our stories and posts, we show the most common mistakes users make when they ride an e-scooter and explain what they should do instead

TV Campaigns-slogan

Wear *it* t-shirts, caps, rubber wristbands,-e-scooter businesses can distribute t shirts (with warning signs) for some time

OOH Advertising

- Outdoor floor ads (like it was in an abortion case,e)
- Posters e.g. Be cautious save lives

Basics of road safety in the app

use bike lanes
not to ride on the sidewalks
park only in designated areas
local traffic rules
keep riders informed about no-go zones
leaving city boundaries
ending a ride in no-park zones throughout their experience
Galisa quiz

Collaboration with non-profit organization

Safety measures and rules- short run solutions unless decided by law- AWARENESS CONTENT

- RULE #1: Riding solo
- RULE #2: Wearing a helmet
- RULE #3: Riding in not busy areas
- RULE #4: Not using phone while riding
- RULE #5: Setting the scooter upright
- RULE #6: Keeping scooters out of the rain
- RULE #7: Following regular road safety

Behavioural changes

- **Problem**-severe lack of public awareness about safety rules
- **Solution**-Raising public awareness of need for safety requirements
- **Why?**
- Convince policy makers of the urgency of a certain issue
- Educates people about the topic
- Output: 8.9% decrease of accident rates

- **Risks**
- Misperception-It can be perceived as a propaganda rather than a preventive action
- Or perceived as a money laundering
- **Risk Mitigation**
- Transparency in showing data on the quantity of the injured before and after campaigns
  - CRRC Armenia
  - Economy and Values Research Center
  - HRRC Armenia

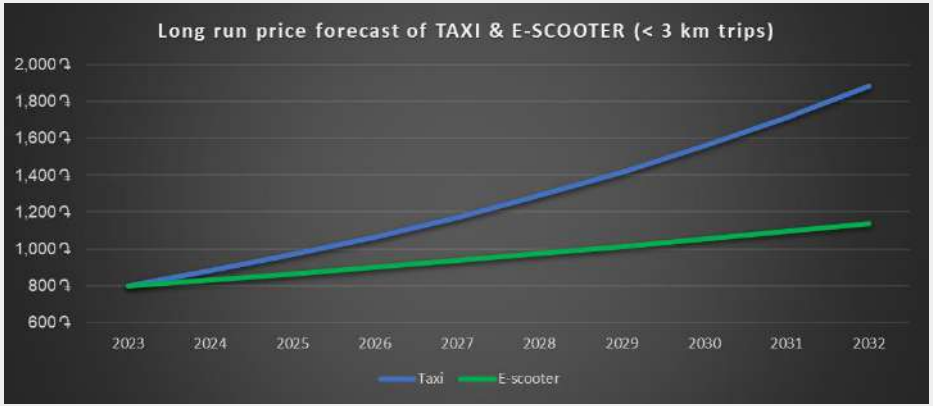
Ideas we can destroy- Banning scooters?

Many people see the solution of the above-mentioned problems in banning the scooters. However, the world is moving towards shifting from other PT measures to e-scooters. This is done because of on-road in PT congestion, which is gradually getting out of hand. In Yerevan this issue is present as well, and taking into account that Yerevan is a small city, people would prefer shifting to e-scooters when crossing small distances.

Also, recently many private investors such as “Jet AM” LLC and “EGEA” LLC have made significant investment in launching e-scooter services in Armenia. Besides being an alternative transporting solution, this also suggests creation of new workplaces.

In Yerevan there are several public transportation means - buses, microbuses, trolleys, subway, taxis. However, we still have a congestion problem in main three transportation means (buses, microbuses, subway). Taxis, which have the most common characteristics to e-scooters, have been increasing fares abruptly recently. Now we will present you a financial analysis with taxi and e-scooter comparison in the long run, which will show that for average citizen riding an e-scooter is more profitable in the long run.

Financial Analysis: Taxis VS e-scooters in 10 year time horizon



As seen from the graph, taxi prices are expected to grow on a much higher rate than e-scooter prices.

NPV *(in AMD)*	2,819,001,855
For trips with distance <	3 km
Time horizon	10 years
Location	Yerevan, RA
Taxi expenses (NPV, *in AMD*)	4,917,504,967
Saved % of estimated taxi expenses	**57%**

Taxi factors: gas, petrol, automobile maintenance costs, average wages of drivers or courriers
E-scooter factors: electricity, technical caracteristics will be improved in time increasing scooters' effecieny, competition may drive prices down

We used NPV analysis and compared taxis with e-scooters. If average wage earning people choose e-scooters over taxis, they would save 57% of the estimated expenses in 10-year time horizon.

Thanks!

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International overview of practice

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Legislation

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Behavioral

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Technical

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Ideas we can destroy

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Financial calculation

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- https://www.arlis.am/DocumentView.aspx?docid=136979
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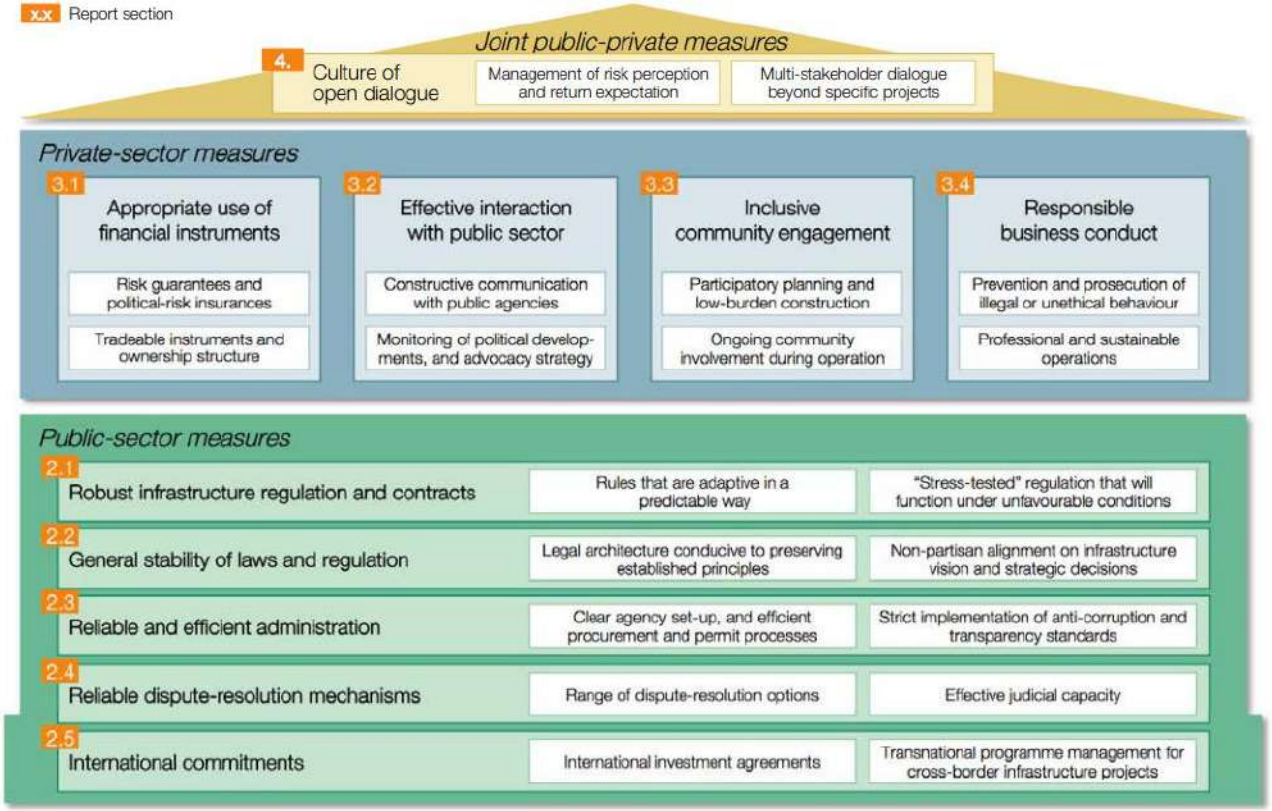
Figure 7: Risk-Mitigation Framework



Source: World Economic Forum; Boston Consulting Group

BCG risk mitigation framework

Future suggestions

Future implementation of scooters with camera-based sidewalk detection using AI

Will work when proper city infrastructure with full roads and standarts will be implemented

Appendix 1: NPV analysis: NPV of saved money in case of using e-scooters instead of taxi for short distance trips,

Year			2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Number of customers (1)			493,135	542,449	596,693	644,429	695,983	751,662	811,795	860,502	912,133	966,860
Minimal fee of taxi, in AMD, (2)			800	880	968	1,065	1,171	1,288	1,417	1,559	1,715	1,886
E-Scooter price per minute, in AMD, (3)			40	42	43	45	47	49	51	53	55	57
Average speed of e-scooters (kmh)			9	10	10	10	10	11	11	11	11	12
1 km	3%	1	13,001	14,301	15,731	16,989	18,348	19,816	21,401	22,686	24,047	25,489
2 km	23%	2	114,707	126,177	138,795	149,899	161,891	174,842	188,829	200,159	212,169	224,899
3 km	48%	3	237,027	260,730	286,803	309,747	334,527	361,289	390,192	413,603	438,420	464,725
time	60	minutes	86,673	90,322	94,386	101,934	110,088	108,087	116,733	123,742	131,165	127,445
			1,529,427	1,593,815	1,665,540	1,798,788	1,942,692	1,907,367	2,059,953	2,183,553	2,314,571	2,248,990
			4,740,540	4,940,147	5,162,454	5,575,446	6,021,486	5,912,002	6,384,960	6,768,049	7,174,145	6,970,875
Total time consumed (minutes) (4)			6,356,640	6,624,284	6,922,380	7,476,168	8,074,266	7,927,456	8,561,645	9,075,344	9,619,882	9,347,310
Consumer expesnes (in AMD) in case of												
Taxi			394,508,000	477,354,680	577,599,163	686,187,805	815,191,113	968,447,042	1,150,515,086	1,341,500,590	1,564,189,688	1,823,845,176
E-scooter			254,265,600	275,570,223	299,489,848	336,386,890	377,829,968	385,798,512	433,328,513	477,701,324	526,618,901	532,165,469
Difference			140,242,400	201,784,457	278,109,314	349,800,916	437,361,145	582,648,530	717,186,573	863,799,266	1,037,570,787	1,291,679,707
Discount coefficant (5)			0.90	0.81	0.72	0.65	0.58	0.52	0.47	0.42	0.38	0.34
Present value of saved money			125,958,685	162,774,090	201,493,891	227,622,964	255,613,692	305,843,569	338,122,157	365,765,800	394,599,729	441,207,277
Net Present Value of saved money			2,819,001,855									

(1) for further details see apendix 3.

(2) each year + 10% price growth estimation, taking into account the probable inflation of petrol & gas, & other serivces. We do not foresee electromobile usage for taxis in 10 years in Yerevan

(3) inflation of price of 4% each year, the main resource of this transport is electricity, inflation of which is not high, and scooter rental businesses can profit from night charging prices of electricity that are 22% lower than that of day

(3) = average price of 35 AMD + average fixed cost for 2 km distance ~ 5 AMD

(4) see appendix 5

(5) for 10 year forecast - 10 year Treasury bond yield to matruity; see appendix 4

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			1,529,427	1,593,815	1,665,540	1,798,788	1,942,692	1,907,367	2,059,953	2,183,553	2,314,571	2,248,990
			4,740,540	4,940,147	5,162,454	5,575,446	6,021,486	5,912,002	6,384,960	6,768,049	7,174,145	6,970,875
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Taxi			394,508,000	477,354,680	577,599,163	686,187,805	815,191,113	968,447,042	1,150,515,086	1,341,500,590	1,564,189,688	1,823,845,176
E-scooter			254,265,600	275,570,223	299,489,848	336,386,890	377,829,968	385,798,512	433,328,513	477,701,324	526,618,901	532,165,469
Difference			140,242,400	201,784,457	278,109,314	349,800,916	437,361,145	582,648,530	717,186,573	863,799,266	1,037,570,787	1,291,679,707
Discount coefficant (5)			0.90	0.81	0.72	0.65	0.58	0.52	0.47	0.42	0.38	0.34
Present value of saved money			125,958,685	162,774,090	201,493,891	227,622,964	255,613,692	305,843,569	338,122,157	365,765,800	394,599,729	441,207,277
Net Present Value of saved money			**2,819,001,855**									

Appendix 2: Taxi price forecast

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Averaged
Average wage* (AMD)		146,524	158,580	171,615	174,445	177,817	172,727	182,673	189,716	204,048	
Growth rate			8%	8%	2%	2%	-3%	6%	4%	8%	4.3%
Minimum Wage** (AMD)	35,000		55,000					68,000			10.0%
Final Judgement	*prices in taxi serivce are growing much faster than the average wage =>*										**10%**

*source: https://www.armstat.am/en/?nid=12&id=08001
** source: https://www.arlis.am/DocumentView.aspx?docid=136979

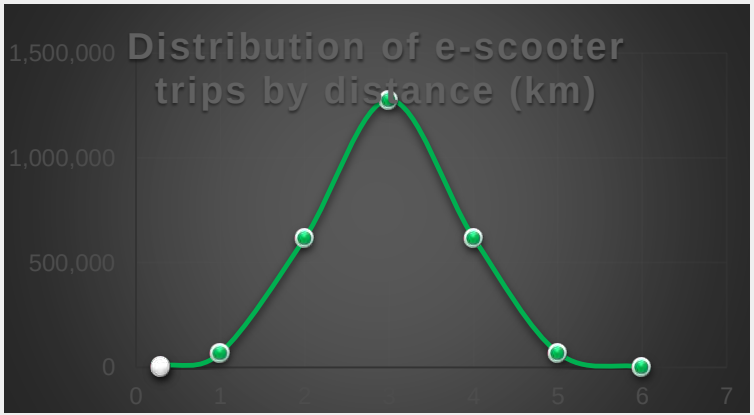
Appendix 3: Passenger number estimation

Daily e-scooter rides	17,500
< 3 km rides	70%
Weekends + not season days	148
Working days	217
yearly, <3 km trips	**2,658,250**

If there were no e-scooters 25% would switch to taxis => 493,135

* under the assumption that the distance of trips has a normal distribution

Distance of trips (km)	Proportion in total*	Number of passengers	Number of passengers with trips < 3 km, in 2020
0.3	0.002	6,435	**1,972,540**
1	0.026	70,080	
2	0.233	618,328	
3	0.481	1,277,697	
4	0.233	618,328	
5	0.026	70,080	
6	0.001	1,860	
Total	**1.00**	**2,660,948**	



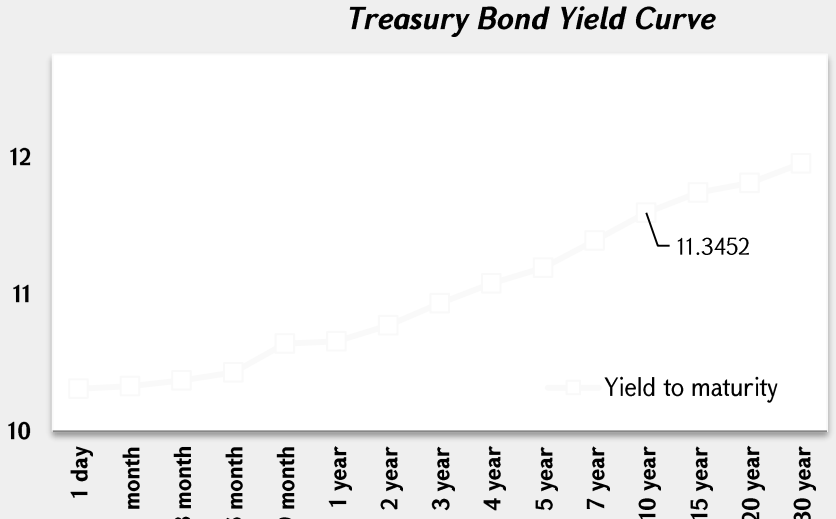
Appendix 4: Discount rate estimation

Treasury Bond Yield Curves (ACT/ACT)			
Date		7/15/2022	
N	Term	Spot	Yield to maturity
	A	B	C
1	1 day	10.0606	10.0606
2	1 month	10.0802	10.0802
3	3 month	10.1206	10.1206
4	6 month	10.1789	10.1789
5	9 month	10.2366	10.3906
6	1 year	10.2937	10.4064
7	2 year	10.4995	10.5225
8	3 year	10.6834	10.6832
9	4 year	10.8466	10.8283
10	5 year	10.9896	10.9428
11	7 year	11.2332	11.1421
12	10 year	11.5058	11.3452
13	15 year	11.8133	11.4916
14	20 year	11.9642	11.5630
15	30 year	12.2661	11.7059
Treasury Bill Yield Curve (ACT/360)			
16	1 day	10.0050	
17	7 day	10.0089	
18	14 day	10.0134	
19	30 day	10.0238	
20	90 day	9.9559	
21	180 day	10.1789	
22	270 day	10.3069	
23	365 day	10.5696	

Discount rate	=	Risk free rate	+	Risk Premium*
Discount rate	=	11.34%**	+	0
Discount rate	=	11.34%		

*as the Discount rate is being calculated for consumers and not for business units, the 2nd part has been excluded in this case.

**an estimation for the “Risk free rate” has served the 10 years treasury bond yield rate , source: https://www.cba.am/en/sitepages/fmofinancialmarkets.aspx



Appendix 5: Estimation of time spent on e-scooter

Year			2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
E-Scooter price per minute (*in AMD)**			40	42	43	45	47	49	51	53	55	57
Average speed of users of e-scooters (kmh)			9	10	10	10	10	11	11	11	11	12
1 km	**3%**	**1**	13,001	14,301	15,731	16,989	18,348	19,816	21,401	22,686	24,047	25,489
2 km	**23%**	**2**	114,707	126,177	138,795	149,899	161,891	174,842	188,829	200,159	212,169	224,899
3 km	**48%**	**3**	237,027	260,730	286,803	309,747	334,527	361,289	390,192	413,603	438,420	464,725
Estimated time for trips with distance of												
1 km	**60**	**minutes**	86,673	90,322	94,386	101,934	110,088	108,087	116,733	123,742	131,165	127,445
2 km			1,529,427	1,593,815	1,665,540	1,798,788	1,942,692	1,907,367	2,059,953	2,183,553	2,314,571	2,248,990
3 km			4,740,540	4,940,147	5,162,454	5,575,446	6,021,486	5,912,002	6,384,960	6,768,049	7,174,145	6,970,875
Total time consumed *(in minutes)*			**6,356,640**	**6,624,284**	**6,922,380**	**7,476,168**	**8,074,266**	**7,927,456**	**8,561,645**	**9,075,344**	**9,619,882**	**9,347,310**

*see appendix 6
**according to the estimated distribution proportions, see appendix 3.

*** calculated only for trips < 3 km, so those, who use for other purposes, such as entertainment, were excluded

Appendix 6: Comparison justifications for taxis and e-scooters

E-scooters	
Main purpose of usage	transportation from A to B point
Average distance (km)	3
main caracteristics	does not require much efforts to ride
	easy to pick up from almost every spot and leave at your desitnation

Means of transportation	Why is **comparable**	Why **is NOT** comparable
Metropolitan	no congestion	few picking & dropping stations
Buses		congestions, crwoded
Bike	Requires to use apps	demands phisical efforts to ride
Taxi	many picking & dropping places	congestions

E-scooters	
Main purpose of usage*	transportation from A to B point
Average distance (km)	3
main caracteristics	does not require much efforts to ride
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Means of transportation	Why is **comparable**	Why **is NOT** comparable
Metropolitan	No congestion	Few picking & dropping stations
Buses		Congestions, crwoded
Bike	Requires to use apps	Demands phisical efforts to ride
Taxi	Many picking & dropping places	Congestions

Solution evaluation framework: Analysis of Competing Hypotheses

done with PARC ACH 2.0.5

		Relevance	H: 1	H: 2	H: 3	H: 4	H: 5	H: 6	H: 7
			Insurance	license	safety measures	patrol regulation	age requirement	app+ speed limit	scooter roads
	Weighted Inconsistency Score ➪		-4.121	-4.707	-3.414	-1.0	-4.121	-3.414	-2.828
	Enter Evidence								
E10	Lack of road police regulation	MEDIUM	C	I	I	C C	C	NA	N
E9	Lack of road signs for scooters	MEDIUM	NA	I	C	C	I	N	C
E8	No public awareness	HIGH	NA	NA	NA	NA	NA	NA	C
E7	No technical checkups	MEDIUM	I	I	C	C	I	I	NA
E6	No punishment for Reckless behavior	HIGH	NA	C	N	C C	C	C	I
E5	Absence of strong reflectors, visibility	MEDIUM	I	I	C	I	NA	C	N
E4	No minimum age requirement	HIGH	C	C	N	C	C C	I	I
E3	Lack of protection	LOW	I	I	C C	C	I	C C	C C
E2	No license requirement	MEDIUM	C	C C	I	C	C C	I	N
E1	No special roadways for scooters	HIGH	I	NA	I	C C	I	C	C C

Cont: Solution evaluation framework: Analysis of Competing Hypotheses

done with PARC ACH 2.0.5

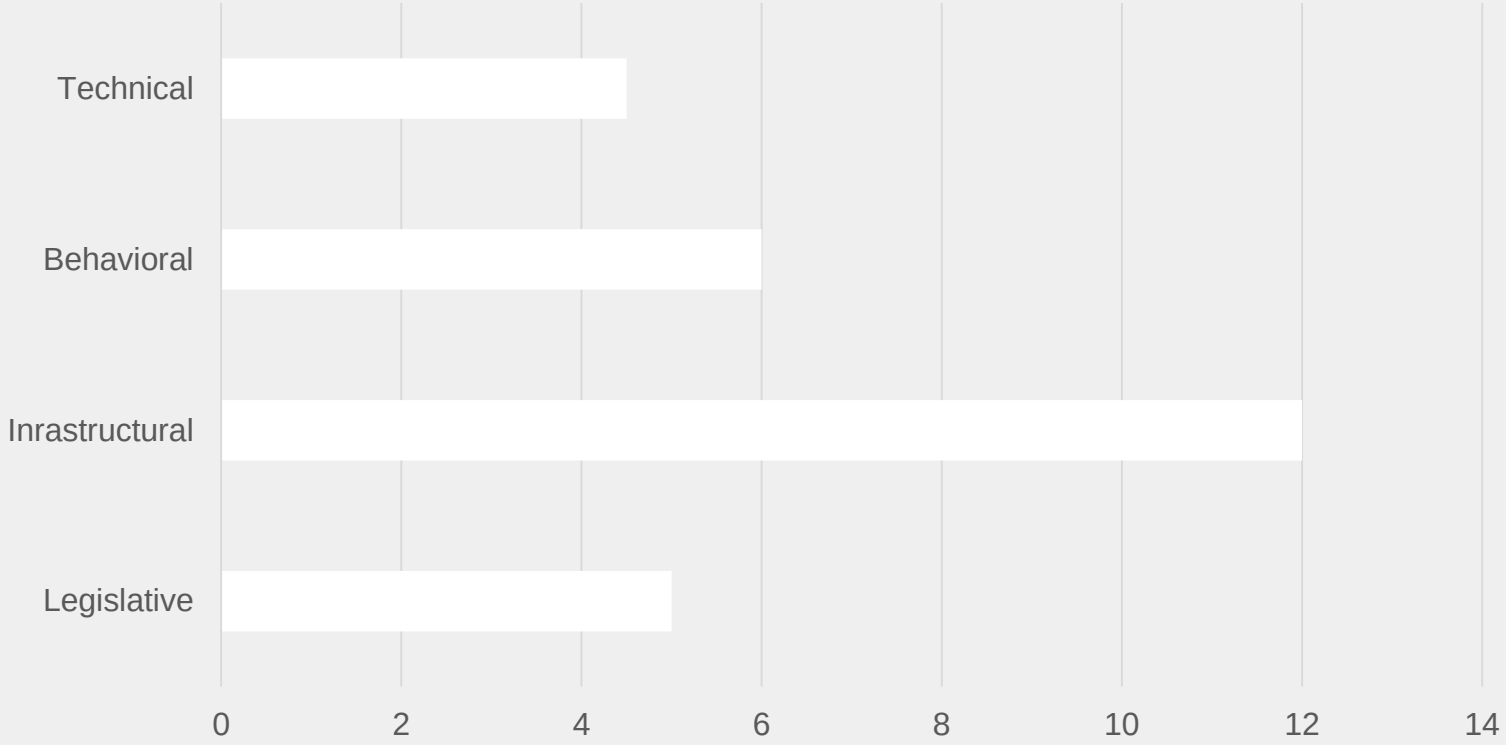
H: 8	H: 9	H: 10	H: 11	H: 12	H: 13	H: 14	H: 15
road signs	special parking spots	refelctors, lights, signals	app + reports self-damage	app+ limiting traffic in busy streets	app+ scoring system	ad campaign (public awareness)	fines
-6.242	-4.121	-5.242	-7.242	-5.414	-4.121	-1.0	-3.828
C	C	N	I	C	C	NA	NA
C C	C	N	I	I	I	NA	I
C C	C	N	I	I	N	C C	I
NA	NA	N	C C	I	N	I	C C
I	C	I	C	C	C C	NA	C C
I	I	C C	C C	I	I	NA	NA
I	I	I	I	NA	C	NA	C C
C	I	C C	C	C	I	C	C C
I	I	I	I	I	C	NA	C C
I	N	I	I	N	I	NA	I

The importance of building special roads for scooters

Special roads for scooters have several important missions to fulfill:

- **1. Pedestrian safety**: one of the main causes of frequent collisions is the use of scooters on sidewalks, if there are separate roads, it will be prohibited to ride on sidewalks and parks, people who will use scooters as a means of transportation can use a special road, and those who want to just use scooters for fun will have a dedicated special place
- **2. Traffic improvement**: at many peak times, scooters with their dedicated lane are a real lifesaver for people avoiding traffic jams (that's everyone :D), and in the long run, noticing the comfort and smoothness of the scooters, many drivers will prefer them because they are fast. , flexible, almost cost-free compared to the car and do not harm the nature, which in turn will contribute to the relief of the main traffic roads
- **3. Ensuring coordinated traffic:** clearly separated roads will allow to see the behavior of scooter drivers, it will give an opportunity to punish bad drivers within the limits of the law, which will contribute to the reduction of accidents involving scooters, while without separated roads, it is largely impossible to regulate or notice unruly drivers.

Timeline


Technical
Behavioral
Inrastructural
Legislative
0
2
4
6
8
10
12
14