





# **The Social Dimension in Transportation Planning**

## A Policy Paper

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# Abbreviations

<b>CREATS</b>	Cairo Regional Area Transportation Study
<b>CTA</b>	Cairo Transport Authority
<b>EBRD</b>	European Bank for Reconstruction and Development
<b>ECM</b>	Egyptian Company for Metro Management and Operation
<b>ENR</b>	Egyptian National Railway
<b>EPC</b>	Emirates Policies Centers
<b>GC</b>	Greater Cairo
<b>GCTRA</b>	Ministry of Social Solidarity
<b>JICA</b>	Japan International Cooperation Agency
<b>MOT</b>	Ministry of Transportation
<b>MOCIT</b>	Ministry of Communication and Information Technology
<b>NAT</b>	National Authority for Tunnels
<b>PWDs</b>	People with disabilities.
<b>ROI</b>	Return on investments
<b>TBD</b>	To be determined
<b>TBW</b>	The World Bank

## Executive Summary

The transportation sector is vital for Egypt's total development as a state and its infrastructure. Its perceived importance has pushed the Egyptian government to invest approximately EGP 1 Trillion to develop and enhance its infrastructure and services, including public transportation. Public transportation and its services are a main player in Egyptians' daily lives, particularly for the poor. It links the production and consumption areas in many vital aspects, including economy, construction, and social development.

This policy paper sheds light on the significance of having an accessible public transportation system in Egypt for the citizens and its role as a social dimension for them. Digitization was identified as a prominent solution to connect various modes of transportation in Greater Cairo (GC) that would help increase the use of public transportation in general and resolve the issue of intermodal transition. In this paper, the adopted definition of accessibility focuses on the availability of different modes for all citizens and its ease of access and switching between them in GC. GC is the main geographical focus in the paper is due the existence of major opportunities and services such as education, work, health, etc. due to centralization of these services in this region.

The paper is based on different qualitative and quantitative data collection methods to collect primary and secondary data, such as:

- Conducted desk research to write the literature review.
- In-depth interviews with Dr. Karim Hussein from the International Cooperation Unit in the Ministry of Transportation and Dr. Khaled El-Safty, Dean of Transport and Logistics in the Arab Academy for Science and Technology.
- Focus group discussions with twelve Egyptian participants from different age ranges, social classes, and affiliations.

Four policy options were proposed to improve the accessibility of Egyptian public transportation and its modes using the tools of digitization, such as a mobile applications, a public transportation network on Google Maps, an integrated station with digital system, and interactive digital maps in the stations.

The decision rule was taken based on the alternative that would effectively amend the fragmented system of public transportation and provide accessibility to it for a broader population of the commuters. Hence, it increases the social inclusion of public transportation system in GC. Political and technical feasibility were the main criteria for selection, followed by equity and economic criteria as a tie, and finally administrative criteria.

Based on the criteria analyses, the development of a comprehensive mobile application for all public transportation, including CTA buses and minibuses, metro lines, and railway stations, was the most favorable policy alternative. Future modes would be included such as monorails and electric trains. Even though the other three policies are also possible solutions, this one is currently the optimum solution. The recommended policy complements advanced policies and ongoing improvements in public transportation and its services by the Ministry of Transportation (MOT). It also fits in the digital transformation agenda of the country. Currently, it is missing the principal element in the system of public transportation.

## Problem Statement: The Egyptian Case

In this paper, accessibility to public transportation has been adopted as a social dimension, because the general status of public transportation system is fragmented and chaotic. Therefore, it is not fully accessible for the public. Hence, Egypt's public transportation system has an urgent need for a policy that uses digitization to enhance its accessibility through connecting all transportation modes in one place where commuters can find routes, timings, and available options that suit their needs for planning daily commute. This policy research addresses the question:

**How can we improve the accessibility of Egyptian public transportation and its modes using the tools of digitization?**

### **Background**

The concept of accessibility has been utilized in various contexts. Litman (2008) defined accessibility as the potential for interaction and exchange or a certain location in which certain activities and opportunities are available. Marten & Di Ciommo (2017) referred to accessibility as a personal resource that allows the availability to participate in the desired activities outside home through a transportation system. Dalvi & Martin (1976) posited that accessibility is the ease with which any land-use activity can be reached from a location using a particular transport system. Hence, accessibility is linked to the facilitated contact to a transportation system that enables reaching desired interactions and opportunities for a person.

Accessibility is an important term employed in public transportation. Geurs & Van Wee (2004) conceptualized accessibility as "the extent to which land-use and transport systems enable groups of individuals to reach activities or destinations by means of a combination of transport mode(s)" (p.128). Litman (2008) defined accessibility in transportation through a measurement called the connectiv-

ity index. This index includes transportation demand and activity, mobility, user information, transportation options and affordability. Furthermore, Ghonimi (2017) added that citizens use public transportation based on its accessibility and proximity to them, which is measured by expense, availability, quality, safety, comfort and flexibility.

Henry et. al (2014) defined accessibility in a social context as the degree of availability and ability to access or benefit from a product, device, service, system, entity, or environment to the broader population. According to the in-depth interviews, the social dimension of accessible transportation is of great salience for the community and is considered one of the dimensions of sustainable development. Tiwari (2003) and Fol & Gallez (2014) added that the social accessibility of transportation has an economic significance such as providing access to the job market and economic opportunities as well as social communication through facilitating traveling time and efficiency. Hence, enabling more access to transportation can be the vehicle for social change. Another salient element of the social dimension of accessible transportation is equality. Accessible transportation does not only provide access to opportunities in urban areas and big cities, but it is also crucial for rural areas. Tiwari (2003) contended that investments in transportation to make it more available provide better access to education and health, and more job opportunities when connecting citizens in rural areas to the place of these opportunities. Therefore, accessible transportation contributes to the economic and social development for a broader population, which achieves equality. Accessibility is defined in this research based on combining the relevant elements in the previous definitions as:

*"the degree of availability, ease of access of public transportation system and switching between its modes in Greater Cairo where the major opportunities exist due to the city's centralization to the broader population."*

## Problem Statement: The Egyptian Case

Accessibility of transportation in the Egyptian context is associated with the facilitation of car movements and driving in general (Kalila, 2019). Most of the projects aiming to improve accessibility in Egypt are concerned with building roadways, while facilitating traffic for cycling, enhancing public transportation<sup>1</sup> modes and sidewalks are overlooked. Thus, Kalila (2019) suggested that accessibility in Egypt should be oriented towards developing public transportation services and paying attention to the mobility infrastructure beyond just roadways, such as improving sidewalks and bus stops to reflect positively on the quality of services of public transportation.

### The Current Status of Egypt's Public Transportation System

The policies that have been advanced by the government focus on developing the infrastructure of public transportation and its serving functions through employing technology, public transportation line extensions, increasing affordability through decreasing prices for senior citizens, easing commuting and physical accessibility to some segments such as PWDs and making it safe for women. Many of these policies were solutions to problems in public transportation or aimed to elevate its performance level. On the ground, the advanced policies have improved the quality of public transportation services, which is also reflected in the participants' input in the conducted focus group discussion. This improvement could be interpreted in the enhancement of accessibility.

However, the main observation is that **the system is still fragmented and chaotic**, and such a challenge hinders the progress that the advanced policies are achieving or aiming to achieve. Hence, this enhancement is on a micro level of each transportation mode rather than a bigger scale. On a micro scale, a commuter could access a public transpor-

tation mode and navigate through it easily. However, on a macro level, merging between different transportation modes is still a challenge due to the unintegrated chaotic system. Therefore, efforts to develop public transportation will never be fully fruitful as long as the system is fragmented.

Fragmentation is defined in this context as an unintegrated system in which every public transportation mode is not connected to one another, because, according to the participants, citizens ride and switch between at least two different kinds of public transportation modes when they commute from point A to point B in a single ride. Therefore, despite facilitating accessibility in many aspects within a mode, the whole system of public transportation itself is still fragmented and unconnected. Hence, the public transportation system on the macro level is fragmented, which could be interpreted as socially not accessible for all the segments because being unconnected hinders accessibility.

*"Integration and connectivity of transportation are among of the foundations of sustainable development"* – Dr. Karim Hussein.

A fragmented public transportation system hinders development because it aggravates commuting to vital destinations for citizens such as education, work, health services, etc., since citizens would face a difficulty in the whole process of commuting when they ride and switch between one mode to another without having a proper platform that enables to them to do so easily. In such context, accessibility is generally a challenge for all segments of commuters, which is represented in this paper as a social dimension. Despite the advanced efforts in the public transportation sector, public transportation modes are still not connected through a network that is available for the commuters.

*"There is a digitization revolution in Egypt"* – Dr. Khaled El-Safty

<sup>1</sup>The researchers defined public transportation in this paper as the system of transport that is used by the Egyptian public under the authority of different governmental authorities such as MOT and CTA. It includes buses, minibuses, metro, railways, and other possible modes.

## Problem Statement: The Egyptian Case

Moreover, the MOT under the charge of Minister Kamel El-Wazeer has started to study and implement the digitization of the transportation sector through transforming its services on online platforms to facilitate the accessibility of the MOT services and raise its efficiency. Hence, it is considered as a window of opportunity for a solution.

### **The Main Challenges**

EPC (2015) stated that the transportation sector is vital for the total development of Egypt. The role of transportation in general and public transportation in particular is essential in the daily lives of the Egyptians, especially among the poorer segments. Abdallah & Ferro (2017) stated that public transportation links the production and consumption areas, as services and opportunities in Egypt are centralized in specific places such as Greater Cairo. Hence, public transportation enables the mobility of Egyptians to vital services such as health services, education, and work opportunities. TWB (2014) and El-Kadi (2013) added that this situation has resulted in public traffic congestion and lack of smooth mobility. Therefore, it has pushed the government to invest EGP 1 Trillion in the transport sector to involve all the executed and further planned projects from 2014 – 2024 (El-Youm El-Sabae, 2020; Al-Mal News, 2020).

The investments cover a wide range of areas such as public transportation modes (railways, metro, public buses, future mono-rails and electric trains), enhancing the current road networks and expanding them, developing and expanding marine and land ports, and building integrated station (El-Youm El-Sabae, 2020; Al-Mal News, 2020). The main purpose of these investments is to raise the efficiency of the transportation sector to facilitate the commuting process for all the assets, whether human assets or goods, to serve in the overall development of the society to achieve its agenda of welfare and sustainable development. However, the current status of Egypt's public

transportation system still faces critical challenges until the investments are fully executed and implemented.

- *The Reduced Accessibility and Reliability of Public Transportation*

Many segments of the Egyptian population depend on public transportation to ease mobility from one place to another to serve their daily needs. However, El Kadi (2013) illustrated that dependency on public transportation in Egypt is affected by different problems such as being uncomfortable, noisy, crowded, not on schedule, often breaking down, and being worn out, despite its affordability for the majority of Egyptians. These problems are also underlined under the six concepts of accessibility as defined by Ghonimi (2017). In addition, El Sheikh (2012) mentioned that switching between different modes of public transportation is another challenge that is not easy to manage, especially when there is no informational accessibility to know the nearest mode of transportation. Hence, the difficulty in switching modes of transportation is adding another level of inflexibility and inaccessibility of transportation in Egypt based on Litman's (2008) connectivity index.

- *Overlapping Authorities*

*Regulating the transportation sector in Egypt involves overlapping institutions and bureaucratic administration. Abdallah & Ferro (2017) stated that each governorate is mainly responsible for its own transportation methods such as taxis and mini vans, but there are exceptions such as Greater Cairo (GC) Metro and railways. GC and Alexandria have specific transport authorities. Nevertheless, all of the transportation authorities are subject to the authority of the Ministry of Transportation. The main governmental players in the transportation sector in GC as it is the focus of the paper are:*

- The Ministry of Transportation (MOT): is the umbrella for ECM, NAT and ENR, and the operation and maintenance of road networks.
- Cairo Transport Authority (CTA): an umbrella for all the busses and mini-busses (including private partnerships companies) operate in GC, works under the umbrella of Cairo Governorate and in align with MOT.
- Egyptian National Railway (ENR): construction and operation of railways in Egypt.
- Egyptian Company for Metro Management and Operation (ECM): operates, manages and maintains GC Metro.
- The National Authority for Tunnels (NAT): planes and executes tunnels for GC metro.

Different policymakers contribute to the scene of public transportation in GC, which cause overlapping in field of actions and delaying the timeframe of taking an action or suggesting and implementing policies that could work in favor of enhancing the accessibility of public transportation in GC to the residents.

## Stakeholder Analysis<sup>2</sup>

Stakeholder / aspect	Stakeholder defined	Stakeholders and public transportation		Policies mapped to stakeholder	Proposed solution
		Affecting the problem?	Affected by the problem?		
Public transportation users	Users of public transportation in GC who include its modes in planning their trips daily or occasionally. They do not necessarily live near a public transportation hub. They include all citizens who live in GC or come to it for opportunities from different social classes, ages, and genders.	—	Reaching the nearest public transportation mode is challenging. Switching and transitioning between various modes of public transportation is still a key issue due to the fragmented system.	Improvements in the quality of public transportation services. Implementing availability codes and tickets discounts to PWDs. Implementing ticket discounts to senior citizens ages +60. Implementing campaigns against sexual harassment and violence against women in railway stations.	Digitization addresses the key challenge to the use of public transportation by different types of commuters. It will deliver more access to public transportation.

<sup>2</sup>Stakeholder analysis is based on a literature review, conducted in-depth interviews, focus group discussion, and observation from the researchers.

Stakeholder / aspect	Stakeholder defined	Stakeholders and public transportation		Policies mapped to stakeholder	Proposed solution
		Affecting the problem?	Affected by the problem?		
Designers of public transportation system (MOT)	There are multiple players in designing the public transportation system in Egypt. However, all of them are subjected to or necessarily aligned with authority of the MOT. Hence, the MOT is considered the main player in the public transportation system.	MOT is working on several policies related to developing public transportation. An integration of all public transportation modes in GC is still lacking despite the efforts.	—	Investing EGP 1 Trillion in different projects related to the transportation sector such as expanding and enhancing public transportation and employing digitization to the infrastructure of the transportation sector in Egypt	Digitizing the network and services of daily used public transportation modes.
Operators of the public transit	They are drivers and operators of public transportation modes such as Metro, CTA and Mwasalat Misr buses, and railway trains in GC. Monorails and electric trains will be included in the future.	CTA and Mwasalat Misr bus operators are not fully committed to fixed bus stops. Arrival time and location of stops between initial and final destinations are unpredictable. Metro and railway operators have more reliable timetables and stop locations, which would improve commuter access.	CTA and Mwasalat Misr bus operators could also be affected by the lack of transportation planning in terms of traffic congestion and lack of planned functioning bus stops.	No identified recent policies to the operators themselves	A master plan is needed for GC to enhance accessibility to public transportation modes and then digitize its network

Stakeholder / aspect	Stakeholder defined	Stakeholders and public transportation		Policies mapped to stakeholder	Proposed solution
		Affecting the problem?	Affected by the problem?		
Residents around the transportation hubs	Residents who live nearby a public transportation hub in GC from different social classes and ages. They are not necessarily public transportation users.	They could play a role in providing data and information for public transportation users whether face to face or online (if possible) about the available public transportation modes to help them plan their trip.	The fragmented system of public transportation might be affecting their neighborhood and its quality. Hence, a better-organized system would improve their quality of life in their place.	Policies regarding investments in projects related to the transportation sector such as the expansion of metro, electric trains and monorail lines, and building the first integrated station (Adly Mansour Station)	Digitization would help in organizing the different modes of public transportation, which would help in reducing its current chaos. This in turn would help the neighborhood where public transportation hubs exist in the long run.

## Existing Responsive Policies in Egypt

Egypt's transportation sector is dynamic and is regularly updated with new policies, which have dramatically changed due to political and economic shifts. Recently, policies have focused on delivering Egypt's 2030 agenda which mainly focuses on sustainability. These policies also address the previously existing problems the public transportation system such as regulatory failures and limited lines and routes.

- *Regulatory Policies for the Transportation Sector in Egypt*

Abdallah & Ferro (2017) stated that the GC-TRA (Greater Cairo Transport Regulatory Authority) proposed a policy to create a leading authority for the transportation sector in GC. The main aim of the policy was to minimize regulatory failure, increase transparency, accountability, and responsiveness in the transportation sector in GC. Hence, unifying the governmental players into one authority under the umbrella of the MOT might enhance the performance of transportation in GC. Furthermore, Abdallah & Ferro (2017)

also added that a master plan of transportation modes in GC has been proposed as a result of a study called CREATS conducted by JICA and the Higher Committee for Greater Cairo Transport Planning in 2002. It intended to solve the transportation sector problems in GC and contribute to the sustainable development of the region. The resulted master plan aimed at the implementation of effective and productive multi-modal transportation plan and technology to foster sustainable integrated transportation solutions. It was expected to be fully functioning by 2022.

- *Policies for the Transportation Sector in Egypt with Prominent Social Aspect*

In addition to the reformation of transportation and its infrastructure, other policies discussed aspects of accessibility, such as physically, financially, and socially. Public transportation is free of charge for citizens 70+ and 50% off for citizens 60+ using their national IDs.

This policy would be applied firstly in railway and metro stations and in other modes of transportation subsequently (Cairo Governorate Website, 2020; El-Ahram News, 2020). The pricing policy also involves PWDs, as public transportation tickets would be %50 off-charge for them and their assistants as well. In addition, there are new policies that involve facilitating public transportation modes for them through implementing the 'Accessibility Code' to include ramps and elevators inside the stations and add audiovisual signs that would provide extra help and guidance. The 'Accessibility Code' is a protocol signed by the MOT and Engineering Syndicate in 2017 (Cairo Gov. Website, 2020; El-Youm El-Sabea, 2019 ;2017; El-Watan, 2017).

The advanced policies also focused on women and sexual harassment as one of their prominent problems during commuting by public transportations. A new policy based on an initiative called "Safe Route/ السكة الحديد أمان" provides many ways for women to report sexual harassment cases while they commute by the train such as a hotline, an email, or reporting the case to a customer service desk inside the station. The new campaign is sponsored by ENR, EBRD and the National Council for Women (Al-Masry El-Youm, 2020; Akhbar El-Youm, 2020; El-Youm El-Sabea, 2020).

- *Policies for Infrastructure Development in the Transportation Sector in Egypt*

There are new policies introduced that aim to develop the digital infrastructure of transportation in Egypt. One of the policies was a partnership announcement between Google Maps and Mwasalat Misr<sup>3</sup>, which enables commuters to spot Mwasalat Misr's buses and minibuses on their smartphones (Sada El Balad, 2019). In the same context, the Head of El-Shorouk City Development Authority also announced the introduction of three new lines between El-Shorouk City

and Abbasia, Alf Maskan and Saray El-Quba digitally located on Google Maps in October 2020. The policy also included a discount for those who pay through digital cards instead of cash (El-Ahram News, 2020). In March 2020, the Minister of Transportation instructed different transportation divisions to finalize the smart card study, which is a proposed unified digital payment method that pays for different methods of public transportation such as metro, buses, railways and monorails and electric trains in the future (Cairo Governorate Website, 2020).

Additionally, there are new line extensions advanced by the MOT in different modes of public transportation that also include digital infrastructure, as an extra step to ease commuting in GC. The MOT started two monorail projects; one connects the New Administrative City to East Cairo, and the second one connects 6th of October City to Giza (Railway Technology, 2020; El-Youm El-Sabea, 2020). Moreover, the most recent popular extension is for the metro lines that aims to cover GC as the following: line 1 (Helwan – New Marg), line 2 (Shubra El Kheima – Moneeb), and line 3 (Attba – Adly Mansour). The most prominent feature in the third metro line extension introduces the first integrated station in Egypt, which is Adly Mansour Station. It includes a metro line, a public bus station, an intercity bus station, a shuttle bus station to Cairo Airport, and an electric train station (El-Ahram News, 2020; NAT, 2013).

<sup>3</sup>Mwasalat Misr is a private company collaborated with the MOT to operate in GC.

<sup>4</sup>Two in-depth interviews were conducted with:

## Policy Successes

Policy successes are identified based on two aspects: their execution on the ground and customer satisfaction. The execution of the previously previewed policies about public transportation would be identified based on two in-depth interviews about the following:

Policy	Execution Status	Percentage of beneficiaries	If not executed-postponed, then why?	Replaced policies, if any.
GCTRA	Cancelled		The authority has changed into the Authority of Regulating Domestic and International Land Transport (جهاز تنظيم النقل البري الداخلي والدولي)	
CREATS 2022	Suspended		Replaced by policies of 2030 Agenda	
Discounted tickets for senior citizens.	Approved & applied	Egyptian citizens +60 and +70		
Safe route for women (railways)	Applied in main stations of Egyptian railways	Women who commute through railway main stations		
PWDs availability code and financial support.	Availability code was taken into consideration in the construction of the 3rd Metro line in GC Financial support applied	PWDs (mainly physically and visually impaired). PWDs and their assistances		
Integrating Mwasalat Misr and Shrouk City bus Routes into Google Maps	Applied	Limited beneficiaries (only for commuters with smartphones and for limited lines)		
Smart payment card for public transportation	The policy is still a study under investigation	TBD		
Line extensions <ul style="list-style-type: none"> <li>• Metro</li> <li>• Busses lines</li> <li>• Monorails</li> <li>• Electric trains.</li> </ul>	In progress	TBD		

## **Customer Satisfaction:**

One of the aims of the advanced policies is to increase the satisfaction of public transportation commuters. Amponsah & Adams (2016) identified the main prominent aspect of customer satisfaction based on how the provided service (modes of public transportation in this paper) meets the expectations of the receiver of these services (the public transportation commuters). One focus group discussion was conducted with Egyptian citizens who commute by public transportation on different levels to know their customer satisfaction. The aspects of customer satisfaction for public transportation modes were adopted from Ghonimi (2017), Amponsah & Adams (2016), El Sheikh (2012), as the following:

### **Availability:**

The majority of the participants in the focus group discussion rated public transportation as highly available in the areas of their residences in GC. The most common available public transportation modes are the metro and the CTA buses. Some of the participants have mentioned the availability of Mwasalat Misr buses. The estimated waiting time for the Metro is 5 to 10 minutes and for the CTA buses about 20 minutes. However, these timings might differ if the mode is crowded. Consequently, participants add more time when planning their trip to ensure they arrive to their destinations on time when they take public transportation (an hour and a half for public buses and 15 minutes for the Metro).

### **Quality of Services:**

Participants agreed that the quality of services in different public transportation modes are better than before and there is a noticeable progress. They evaluated the progress in quality of provided services through the extension of buses and metro lines, the

new models in service, and their increased availability. However, participants also added that there is a room for improvement and the quality could be better, especially that these modes are still crowded. Some of the participants also mentioned that the progress is usually temporary, and it fades away due to the lack of maintenance. The majority of the participants claimed that the current fares of the Metro/ CTA and Mwasalat Misr buses are suitable for the provided service. However, some of the participants considered the prices suitable for a single person but not a family (three persons and up).

### **Comfort:**

Participants mentioned that the comfortability of metro or CTA/Mwasalat Misr busses is based on the timing of riding them. They expressed that rush hours are usually crowded and there are limited seats available, but it becomes better in other timings. The majority of the participants mentioned that the Metro is more comfortable than the buses, and there is usually a provided space to stand/sit. Female participants mentioned that even if the Metro is crowded, there are female-only carriages that provide comfort as their own designated space.

### **Safety:**

Participants have mentioned that public transportation modes are perceived to be safer than before, especially when it comes to above-the-ground modes such as buses. They attributed the increase of perceived safety to the development of roads and replacing the old vehicles with new ones. However, the Metro is perceived the safest public transportation mode for them. provide comfort as their own designated space.

1. Dr. Karim Hussein – Researcher at the International Cooperation Unit at the MOT.

2. Dr. Khaled El-Saqty – Dean of the Institute for International Transport and Logistics at AAST and an expert in field of transportation.

## **Flexibility of switching from one mode to another:**

The majority of the participants usually ride two different public transportation modes and up for a single trip ( e.g., metro & CTA/ Mwasalat Misr buses). They mentioned that switching between public transportation modes, Metro to CTA/ Mwasalat Misr buses and vice versa or between buses is highly challenging. However, they mentioned that changing between different metro lines is easier. One of the participants from PWDs (visually impaired) mentioned that switching between public transportation modes is considered an extra challenge added to the commuting itself due to the disability, as modes are not fully connected by any means. The participants attributed switching as a challenge due to the lack of provided information about the stations and different

routes of different modes. They usually rely on personal experiences, their networks, other commuters, or security individuals to know the provided modes in an area to commute from one point to another. Some of the participants rely on private transportation such as SWVL/ Careem Buses/ Careem or Uber cars to reach far destinations. Other participants have tried to search online for information about the provided public transportation modes that would deliver them to their destination, but information was limited or not found. They also added that online information is mainly related to Mwasalat Misr buses as it is integrated to Google Maps, but it was described as 'limited'. Some of the participants mentioned that they usually check the main stations such as Tahreer/Ramsees/Abbassia/Giza stations to know the new lines provided and their options among transportation modes.

## Policy Options

We adopted multiple methods, including primary and secondary data collection, to formulate the problem statement and policy alternatives. We conducted a desk research to write the literature review. We supplemented this secondary research with in-depth interviews with Dr. Karim Hussein from the International Cooperation Unit in Ministry of Transportation and Dr. Khaled El-Safty, Dean of Transport and Logistics in the Arab Academy for Science and Technology. We also conducted a focus group discussion with twelve Egyptian participants from different age ranges, social classes, and affiliations.

### Policy Alternatives

The following four policy alternatives bridge the gap between the advanced policies in the public transportation specifically and enhance accessibility as a social dimension as previously defined.

1. **Launching a mobile application that provides the whole network of public transportation routes, stations, and possible timetables to facilitate commuting and switching between different modes of transportation in a convenient way (“you are one tap/click away”).**

This policy alternative aims to launch a mobile application that connects different types of public transportation modes such as CTA buses and minibuses, private partnerships such as Mwasalat Misr buses, Metro, electric train, monorails, and railway stations. The mobile application is based on an intermodal mode that facilitates switching between different types of public transportation within a single trip. It also aims to facilitate reaching the nearest public transportation mode in the area and help in planning the trip by including different additional modes to reach the wanted destination. The application will also show the estimated price of the trip and possible timing to reach the destination. It will serve public transportation customers who have a smartphone and internet subscription.

2. **Launching the network of public modes of transportation on Google Maps to locate routes and stations (Mwasalat Misr as a model).**

This policy alternative aims to launch the routes of the modes of public transportation and stations on Google Maps as in Mwasalat Misr. The policy will facilitate searching and finding the routes and stations of the public transportation modes such as the CTA buses and minibuses, metro, electric train, monorails and railway stations. It will help the public transportation customer to show the available options and the network of public transportation in GC. Hence, it will help him/her in planning the trip. It will serve public transportation customers who have a smartphone and internet subscription.

3. **Build a new integrated station with embedded digital system and infrastructure that provides different transportation modes in one place on the west side of Greater Cairo (6th October City) (Adly Mansour station as a model).**

This policy alternative aims to build a new integrated station with an embedded digital system and infrastructure in 6th of October City, which is the west side of GC. The integrated station aims to become a hub that connects different modes of public transportation in one place. Digitization would be embedded as an operating system in the station that facilitates its purpose of providing integration to its services for the commuters. The station is equivalent to Adly Mansour station in the east side. Hence, it is considered a step toward an integrated public transportation system.

#### 4. Provide digitally interactive visual/audio maps in each transportation station that indicates other possible public transportation commuting options near the station exits.

This policy alternative is mainly concerned with providing guiding interactive visual and auditory maps in transport stations to help commuters be aware of the other public transportation options to reach a specific destination. Therefore, it enhances accessibility to the public transportation network and its

modes. Locating these maps in the station exits/stops of the public transportation modes would increase the number of commuters who are exposed to other different available modes as options to consider in their trip. Furthermore, using these maps would allow for a greater efficiency in using intermodal and multimodal<sup>5</sup> public transportation modes. Hence, it will result in increasing the general accessibility of public transportation modes for the commuters in GC.

## Policy Analysis

In order to pick the most suitable policy alternative that responds to the problem statement, we selected five criteria to analyze the four proposed alternatives: economic, equity, technical, political and administrative. The five criteria were selected because they address the main aspects that are taken in consideration when proposing a policy related to digitization according to the in-depth interviews.

### 1 – Mobile Application:

**Economic analysis:** Based on the in-depth interviews, investing in digitization is costly for the government based. Moreover, the current economic strategy for the government is to keep subsidized services on a minimum level. Therefore, it is highly expected that the government would raise the price of the public transportation services to cover its investments costs in launching the application. However, raising the prices of the services would be a burden on the customers and push them away to consider other private transportation options. On the other hand, the application would provide integration and connection to the fragmented system of public transportation. Thus, it will increase accessibility to its modes and in turn the number of customers and trips, which will result in increasing the public sector rev-

enue and paying off the cost of investments.

**Equity analysis:** Customers from the following social criteria would benefit from the policy:

1. Users of public transportation services in GC, whether they are residents or not.
2. Users of any different pattern of public transportation in GC (light/moderate/heavy).
3. Those who usually use two public transportation modes and up for their trips.
4. Members of the upper lower class and up from both genders.
5. Users of smartphones and internet bundles of any age.
6. Those who consider using public transportation in GC but are usually driven away because of its fragmented unconnected system.

The policy achieves vertical and intergenerational equity as it serves different segments of the Egyptian society. According to the focus-group discussion, switching between two different public transportation modes is highly challenging due to the fragmented system.

Moreover, there are no official records to provide information about such services. Hence,

<sup>5</sup>Having different modes of transportation as options to arrive at the same destination.

there is an urgent need for this application. The government would initially finance the application, so it would be paid from the public budget. However, many segments would have better access to public transportation services. Hence, the social and financial benefits outweigh the financial burden.

**Technical analysis:** According to the in-depth interviews, the application is technically feasible. Moreover, the MOT is carrying out several digitization projects such as the smart payment card and linking marine and land ports digitally together. Hence, the application as a policy would fit into the current technical agenda of the MOT.

**Political analysis:** The policy has a high acceptability rate by the MOT as a decision maker, as it fits in its current digitization agenda. It is also predicted to have a high response rate, because it meets the needs of targeted commuters as mentioned by the participants of the focus-group discussion. It also meets the legality aspect, as there is no law against having the public transportation modes and services connected through digitization. In addition, the Egyptian society is currently shifting toward digital services and started to rely heavily on them. Hence, the policy would be highly appropriate, needed by the society, and fits into the agenda of the legislatures.

**Administrative analysis:** The application would be under the supervision of the MOT and its authorities and the MOCIT to facilitate its construction, launching, enhancement and updates. Technological partners would cooperate with the MOT and the MOCIT to provide the know-how of the application and its maintenance such as the Japanese University.

## 2 – Public Transportation Network on Google Maps

**Economic analysis:** This option has a considerably low cost compared to creating an application as Google Maps is already a created functioning and highly used application. However, there is another aspect of expenditure in terms of renting space from Google Maps to launch the network of public transportation modes on it. These fees are subjected to an increase from the side of Google Maps, which might shake its sustainability as a provided service in the future. On the other hand, high revenues are expected through the increasing use of public transportation, as more commuters will have more accessibility to public transportation from Google Maps through using their smart phones.

**Equity analysis:** The same as the application policy, different segments of customers will benefit from this policy too. Hence, it also achieves vertical and intergenerational equity. The existence of the various modes of public transportation would provide more equal opportunities for those who do not have enough information about transitioning among the distinct modes of public transportation in GC.

**Technical analysis:** This option is technically feasible, as there is Mwasalat Misr as a model to follow. However, this option requires a full cooperation between Google Maps and the MOT and its authorities to be technically executed. Hence, any technical change from any of the parties should be supervised by both such as enhancement in Google Maps application or changes in lines or stations of public transportation modes, to ensure the continuity of the policy. Therefore, based on such context, there might be technical challenges in the future that require a very high technical cooperation.

**Political analysis:** This policy alternative is aligned with the current digital agenda of the MOT, but Google Maps as an independent international company might decrease the acceptability rate from the side of the MOT until the decision of cooperation. It is also predicted that it will have a high response rate from the targeted customers based on the focus group discussion. From a legal aspect, launching the whole public transportation network on Google Maps might be hindered from a national security perspective, because the servers are international and might collect data about the patterns of commuting and users.

**Administrative analysis:** Implementing this option is coordinated between the MOT, the MOCIT and Google Maps. However, Google Maps is an independent international company that is not subjected to a direct authority of the MOT or the MOCIT, which might result in bureaucratic obstacles to achieve the cooperation.

### 3 – An Integrated Station with a Digital System

**Economic analysis:** This policy option has the highest expenditure of all alternatives. The main costs are concerned with building the station, utilizing its digital system as well as operations and maintenance. However, there is also a high expected revenue of this station as it is expected to increase the use of public transportation modes because of its integration in the west side of GC, given that there is currently no integrated station there. The cost of implementing this policy would be based on public and/or private investments.

**Equity analysis:** This option is convenient for all citizens particularly customers from different segments who commute regularly to and from 6th October city including workers, residents and visitors from any age, gender, or class. Moreover, the digital system (audio/visual maps and instructions guiding commuters) would facilitate using the station for

many commuters especially PWDs and illiterates. However, it achieves horizontal equity as it serves the integrated system for the west side only.

**Technical analysis:** Implementing this station is technically feasible. However, the main challenge could be viewed in the long duration of building this station as well as its logistic preparations. Thus, whereas it is technically feasible and necessary, it is not an urgent solution for connecting the modes of public transportation in Cairo in the short run.

**Political analysis:** Implementing this option would support reducing congestion in GC through expanding the networks of public transportation and provide more revenues for its modes due to increasing its accessibility. The main challenge is the focus on planning transportation projects for The New Administrative Capital. Hence, it has a low response rate that might delay its implementation for a long period.

**Administrative analysis:** The policy is directly under the supervision of the MOT and its authorities. Other administrative partners would be included for further operation and maintenance companies that provide the functioning digital system would cooperate and run under the authority of the MOT (Adly Mansour Station provides a model for this). The MOCIT would be included to provide a technological perspective

## 4 – Interactive Digital Maps

**Economic analysis:** The cost of this policy alternative is based on buying, installing, operating, and maintaining the digital visual and audible interactive maps in the exists of public transportation stations in all of GC. Hence, it is considered a very high expenditure. On the other hand, this option would provide revenues for the MOT as these maps would increase accessibility to the provided options of public transportation modes for the commuters in various locations due to the increase of its exposure. Moreover, the commuters' benefit of these maps is ongoing and consistent without the need for personal smartphones or internet bundles. However, the maintenance cost might be a critical challenge for the continuity of these maps.

**Equity analysis:** This alternative is public and highly achieves equity among other alternatives and it mainly targets a very broad range of citizens who commute using public transportation modes from all of its stations to benefit from its services. Additionally, this option allows for a more equal use of transportation if it is well designed and implemented as it offers a comprehensive interactive guide to access more options of public transportation modes. However, the interactive digital maps are located only in the stations of public transportation modes. Hence, commuters who ride public buses and minibuses from a non-official stop would be excluded.

**Technical analysis:** There is no similar model to follow in Egypt for this alternative. The technical feasibility of launching interactive digital maps for the provided option of public transportation modes would be determined through a case study by a related technological company under the supervision of the MOT.

**Political analysis:** The alternative is aligned with the MOT agenda of digitally transforming its services. However, the high expenditure of installation and maintenance might lower its acceptability rate. It provides an innovative and interactive way of using public transportation modes, which attracts more people to use public transportation. Hence, it achieves a response rate from their end. There is no law or legislation against installing these interactive digital maps in the stations of public transportation modes. However, a law would be needed to prevent its misuse or vandalizing by the commuters.

**Administrative analysis:** The alternative is under the authority of the MOT along with the MOCIT due to its technical relevance. A technological company would be another third-party administrative partner would be the technological partner that provides the know-how of installation, operation, and maintenance of this project. The technological company would be under the direct supervision of the MOT and the MOCIT.

# Conclusions and Recommendations

## Decision Rule

The decision rule was taken based on the alternative that would effectively amend the fragmented system of public transportation modes in GC and provide accessibility to it for a broader population of commuters. Hence, it increases the social inclusion of the public transportation system. Political and technical feasibility were the main criteria for selection, followed by equity and economic as a tie, then finally the administrative criteria.

We recommend policy number one 'Launching a mobile application that provides the whole network of public transportation routes, stations, and possible timings to facilitate commuting and switching between different modes of transportation in a convenient way.'

It is the best alternative that addresses the problem statement as a digitization tool that connects all the public transportation modes in one platform where commuters can find routes, timings, and available options that suit their needs for planning daily commutes. It also connects and facilitates switching between different modes of public transportation based on intermodal mode (for example, taking a bus to arrive to a metro station to take the metro to reach the destination). Hence, it will significantly improve accessibility to Egypt's public transportation network in Greater Cairo. It is also technically feasible with a considerably acceptable economic cost with a higher revenue.

## **Why Policy Number One Was Selected**

The policy fits into the current digital transformation agenda of the MOT and Egyptian government, so it has a window of opportunity to be implemented. Also, the application is technically very feasible and provides better safety as its server would belong to and

be supervised by the authority the Egyptian government only (particularly the MOT and the MOCIT). The selected policy provides a long-term scalable solution.

According to the in-depth interviews, linking and connecting between different public transportation modes is a step towards sustainable development because it provides better access to transportation services and eases the commuting process that facilitates a wide segments of citizens' lives. The other policies would benefit commuters but would not provide the full integration to the fragmented system that is urgently needed and could be achieved very easily through digitization compared to the other policies. Commuters usually use two or more different types of public transportation modes in GC in their trips. Therefore, the connectivity would serve a broad range of commuters who face challenges in planning their daily trips that involves two or more than modes.

On the other hand, the fragmented system also eliminates the effects of current improvements in the public transportation sector because the current limited accessibility of the system. Different modes of public transportation are poorly connected and integrated to each other, even if it was intended while planning them. Hence, the policy increases accessibility to public transportation modes to wide segments of citizens who were hindered from fully using its services due to the current fragmented status. Hence, it increases social inclusion and then public revenue.

## **Implementation and Implementing Parties**

The next step is presenting the policy recommendation to the MOT as the main planning and executive umbrella for the transportation sector in Egypt and discussing the window of

opportunity to transform it into a case study to be implemented. The MOT is our main target to prevent overlapping authorities is a challenge and it has the upper hand on every project in the sector. The implementing parties include the MOT, the Authority of Regulating Domestic and International Land Transport, the MOCIT, and the Japanese University (outsourcing digitization projects with the MOT).

## **Limitations and Expected Obstacles**

- *Budget allocation and ROI*

*Budget allocation can be critical due to the current economic conditions in Egypt. A suggested solution is that third parties should be involved as investors inside the domain of the application—advertising offers one option for such involvement. Hence, it will reduce the burden of the investments from the government. Another possible solution is to have a premium version of the application ( e.g., EGP 3 per month) without advertisements or reward programs for customers who are willing to pay. Therefore, combining the rented spaces from the ads inside the application and the premium version would be a source of income for the application to be maintained, and a source to generate ROI.*

- *Urgent need for a master plan*

*The policy would need a master plan for public transportation modes in GC to be integrated in order to achieve connectivity and then increase accessibility. The master plan would be a challenge due to street traffic and congestion. However, connectivity could be achieved between Metro, electric trains, railways, monorails and the main bus station hubs and prominent take off locations as a start. A next level of the master plan would involve bus and mini-bus routes and stops.*

- *Marginalized communities*

PWDs and women might feel marginalized as accessibility has extra implications for them, due to disabilities and sexual harassment. However, further stages of developing the application would involve services that additionally facilitate the accessibility of public transportation according to their specific needs. Audio and visual aids would be provided inside the application to meet specific disability needs. Also, public transportation modes and stations that support PWDs would be highlighted to facilitate their access to them. Furthermore, a service for reporting sexual harassment cases would be also integrated to the application. It would provide a communication channel for women to report sexual harassment incidents that they might face while riding public transportation modes.

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# Appendix

## Appendix 1: Focus Group Discussion Questions:

Please rank the following statements according to you from 5-1:

Statement:	1 (low)	2	3	4	5 (high)
Public Transportations are					
Available					
High quality					
Comfortable					
Safe					
Flexible					

Please express your thoughts toward the following statements:

- Availability of public transportation nearby them (frequent or low rapid buses/ waiting time).
  1. What is the nearby public transportation method for you?
  2. What is the most common method that you usually ride?
  3. How long does it take to wait/ride the mode?
  4. To what extent does the waiting timing suit you? How do you plan your day accordingly?

- Quality of services (crowded/ hours of operations/ service provided for the exchanged price).

1. How do you see the quality of the public transportation modes right now?
2. Is it crowded or empty when you commute by them? Please state timings and conditions of the method by then.
3. What do you think of hours of operations?
4. Is the price of the service high/ medium/low in exchange for the service?

## Appendix

- Comfortability (seats are available/ spaces provided within the mode itself).
  1. Do you usually find empty seats for you when you commute? Rank from 1/5 as (1=seldom and 5=always).
  2. Do you usually find a space to stand comfortably during the commute? (Metro and buses specifically).
  3. Is there anything that bothers you physically/ psychologically within the transportation mode itself?
- Safety (to what extent is the mode of transport safe?).
  1. Do you think that the public transportations that you ride is safe? Why?
  2. Please mention any incident that is related to safety in public transportation from your own point of view.
- Flexibility (the flexibility to change from one transportation mode to another – switching modes).
  1. How many public transportation methods do you use per ride?
  2. How do you switch between two public transportation modes?
  3. When you want to commute from point A to B using multiple methods, what do you usually do?
  4. What platforms do you usually check to know information about public transportation, their timings, and stations?
  5. Have you ever experienced a difficulty to go from one point to another using multiple transportation methods? Rank from 1/5 as (1=seldom and 5=always). Please mention a situation if there is any.

## Appendix

### Appendix 2: In-depth Interviews Questions & Answers:

#### First: Dr. Karim Hussein Interview:

Dr. Karim Hussein is in the international co-operation unit. He established a forum in Transportation Projects Planning Authority in the MOT. The forum aims to develop sustainable transportation and societal communication to connect between academia and executives. There is a partnership with the Japanese University with the forum to do digital twinning.

Dr. Karim was asked about the table of policy successes and to provide his input on the digitization of public transportation. The social dimension deals with all societal segments.

There should be policies that consider children who ride public transportation, e.g., Morocco offers discounted tickets for children in schools.

There should be policies that consider another social aspect for employees, which is to have a subscription to ride public transportation on a discounted fee to encourage them to ride public transportation instead of their private cars. Such policy also serves sustainability and environment.

The integration and connectivity of transportation are among the foundations of sustainable development.

Connectivity is one of the most prominent terms in the transportation field worldwide, and it is one of the challenges of development to achieve it. Adly Mansour Station achieves connectivity between different types of public transportation modes, and it is a model for it. There are two types of modality: Inter-modality (changing between different public

transportation modes within the same trip), and Multi-modality (having different public transportation mode like metro or buses to reach the same destination).

There is a window of support for digitization solutions for public transportation in Egypt. We need innovative solutions for public transportation. Environment, economy, society focus on human for sustainable development. Sustainable development works economically to develop humans.

#### Second: Dr. Khaled El-Saqty Interview:

1. What is the possibility of having an integrated public transportation system through digitization? How could we achieve that? Potentials? Difficulties?

Customers of public transportation are segmented based on two dimensions: who can pay fees and seek better services and who want to reach their destination no matter what. Hence, digitization should consider these two perspectives customers wise.

Dr. Khaled El-Saqty highly recommended that primary data should be obtained from the customers of public transportation to identify the customer requirements. Transportation services are considered a matter of national security.

Reliability of different modes in Egypt: there is no coordination between modes of public transportation in Egypt and this is a huge problem. It is a challenge for digitization as it relies on the reliability of different modes in Egypt. Hence, one of the objectives of digitization is to make a master plan to enhance the flow of public transportation modes and to be reliable. The master plan in public transportation in Egypt should include routes, timings, the estimated time of driving, and infrastructure e.g., stations of metro and buses.

## Appendix

However, Dr. El-Saqtly recommends that we should take into consideration the delay in timing and driving, as it is not predictable in Egypt due to its traffic.

To invest in digitization is costly, based on the trade-off theory in transportation. The theory emphasizes that the cost increases for the customer when there is a new enhancement in the service, as the cost of the invested capital would be added to the price of the ticket. However, there are customers who do not want any extra costs or enhancement in the service; they just want to reach their destinations with the lowest cost possible. Hence, there should be a categorization for digitization rather than standardization. Therefore, there should be solutions for the putting the extra cost of digitization, such as adding the extra cost on the ticket or subsidizing the cost by the government (not applicable due to the current agenda of the government of cutting subsidizing). We should think of responsive scenarios by the customers.

There are eight categories of customers: low income – employed – children and youth – housewives with no independent income from their spouses – PWDs – citizens from rural areas with low source of income – ethnic minorities e.g., from Galala or Sinai. Hence, we cannot unify all these categories because there are gaps so classification and segmentation for each class is the solution. The classification should be displayed as matrix, the vertical axis is end user and the horizontal is IT tools categories (e.g., RFID / VR).

2. Is there any nearby/future policy for the integration of public transportation through digitization?

Dr. El-Saqtly highly recommends connecting between different hubs in Egypt, especially the new cities. Also, the connectivity should take in consideration the Delta and connect it with GC and new cities too. The foundation of connectivity should be based on what the customers need and the services they seek and connect between them. The customer should be the base of connectivity as it serves him/her.

3. What are the recent digitization projects in the field of transportation in Egypt?

- Smart card.
- Application to connect the public transportation in GC.









# THE PUBLIC POLICY HUB

## Where Rigour Meets Creativity

The Public Policy HUB is an initiative that was developed at the School of Global Affairs and Public Policy (GAPP) in October 2017. It was designed to fill in the policy research gap in Egypt. It provides the mechanism by which the good ideas, plausible answers, and meaningful solutions to Egypt's chronic and acute policy dilemmas that are proposed by the country's best minds, the experienced and the creative from different age brackets, can be nurtured, discussed, debated, refined, tested and presented to policymakers in a format that is systematic, highly-visible and most likely to have a lasting impact.

It is designed to develop a cadre of well-informed and seasoned policy developers and advocates, while simultaneously fostering and promoting creative solutions to the challenges facing Egypt today. The project provides a processing unit or hub where policy teams are formed on a regular basis, combining experienced policy scholars/mentors with young creative policy analysts, provide them with the needed resources, training, exposure, space, tools, networks, knowledge and contacts to enable them to come up with sound, rigorous and yet creative policy solutions that have a greater potential to be effectively advocated and communicated to the relevant policymakers and to the general public.

Since its establishment, the Public Policy HUB has been supported by Carnegie Corporation of New York, UNICEF Egypt, and Oxfam. The Hub had partnerships with different ministries and governmental institutions like the Ministry of Social Solidarity, Ministry of Planning, Ministry of Health, Ministry of Trade and Industry, Ministry of Local Development, Ministry of Education, Ministry of Environment, National Council for Childhood and Motherhood, National Population Council, and General Authority For Transportation Projects Planning.

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