Covid-19: Pandemic-Resilient Strategies for Mobility in Smart Touristic Cities

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Abstract:
Reshaping future resilient cities in light of the consequence of Coronavirus (COVID-19) pandemic, as a global pandemic that affects all sectors, particularly tourism, has become an urgent matter. It is a major priority to assist touristic cities to lift quarantine procedures and resume tourism activities in line with epidemiological and health standards. Therefore, the ease of travel and tourism must be weighed against reducing the risks of the spread of the virus. In regard to the difficulty and risk of mobility during this pandemic period, finding a way out will not only allow urban tourism mobility in the world to return to the previous "normal" state, it will also initiate a crisis-resistant future, especially for smart touristic cities that use information and communication technologies. This study aims to develop pandemic-resistance strategies to respond to various crises and unexpected disruption by devising integrated indicators for a smart touristic city to resist pandemics in the urban mobility sector. The study follows an analytical deductive method that begins with a literature review of smart and resilient urban tourism mobility and the potential impacts of Coronavirus (COVID-19) on medium to long term. It studies the most appropriate strategic responses of tourism mobility policy makers in the post-COVID-19 era and inventory possible opportunities to take advantage of that pandemic crisis. In addition, it analyzes some examples of touristic cities that had proven successful in times of pandemics to find smart, resilient, and more human-centered strategies that can be applied to the urban tourism mobility sector.

Key Words:
Smart tourism cities, pandemic resistant cities, resistance strategies for smart urban mobility

الملخص:
أصبح إعادة تشكيل مدن المستقبل المقاومة لعواقب وباء Covid-19 ضروريا، كونه وباء عالمي يصيب جميع القطاعات وعلي رأسها السياحة . تتوقع منظمة السياحة العالمية (UNWTO) انخفاضًا في السياحة الدولية بنسبة ٦٠٪ إلى ٨٠٪ مقارنة بالعام الماضي ولذلك اصبح علي راس الاولويات مساعدة المدن السياحية على رفع تدابير الحجر الصحي واستئناف انشطتها السياحية، بما يتماشى مع المعايير الوبائية ومعايير الصحة لذلك يجب الموازنة بين سهولة التنقل و السفر والسياحة مقابل تقليل مخاطر انتشار الفيروس وعودة الحالات بأعتبار التنقل أصعب الممارسات في خطورته في ظل هذه الجائحة التي لن يؤدي مسار الخروج منها إلى إعادة التنقل السياحي الحضري و التجمعات السياحية في العالم إلى

"الوضع الطبيعي" القديم. وبدلاً من ذلك سيؤدي إلى واقع جديد ومستقبل مرن و مقاوم للأزمات و بالاخص في المدن السياحية الذكية التي تستخدام تكنولوجيا الاتصالات و المعلومات و الوسائل الرقمية. تهدف هذه الدراسة إلى تطوير أستراتيجيات مقاومة الاوبئة التي من شانها توفير خيارات للاستجابة للتغيرات المختلفة وتقديم الحلول في حالة الانتكاسات غير المتوقعة من خلال استنباط مؤشرات متكاملة للمدينة السياحية الذكية لتقاوم الأوبئة في قطاع التنقل الحضري من خلال أسلوب استنتاجي تحليلي يبدأ بمراجعة الأدبيات حول التنقل السياحي الحضري الذكي والمرن و التأثيرات المحتملة لـ COVID-19 علية على المدى المتوسط إلى الطويل و دراسة الاستجابات الإستراتيجية الأكثر ملائمة لصانعي سياسات التنقل السياحي ومقدمي الخدمات في حقبة ما بعد COVID و حصر الفرص الممكنه للاستفادة من تلك الكارثة الوبائية بالإضافة إلى تحليل بعض الأمثلة للمدن السياحية التي أثبتت نجاحها في أوقات الأوبئة لإيجاد استراتيجيات ذكية و مرنة تطبق على قطاع التنقل السياحي الحضري وتكون أكثر تركيزًا على الإنسان.

الكلمات المفتاحية:
المدن السياحية الذكية، المدن المقاومة للأوبئة ، الأستراتيجيات المرنة للتنقل الحضري الذكي.

Introduction:

Tourism economy has been severely affected by the Coronavirus (COVID-19) crisis and the measures taken to control its spread. The scenarios adopted indicate that the potential shock may range between 60-80% of the decline in the international tourism economy in 2020. Therefore, it is necessary for touristic cities to raise reservation procedures and resume their tourism activities in line with epidemiological and public health standards as lifting measures too early may lead to a second wave of infection. Nonetheless, the availability of a vaccine or treatment is considered inevitable for the ease of safe movement, travel and tourism in order to minimize the risks of facilitating the spread of the virus with more cases that may require re-application of reservation procedures. Thus, by the end of this pandemic period, global tourism will not only return to its previous "normal" state, but it will also maintain a qualitatively new reality for the foreseeable future that is physically distant, highly sterile, and convincingly healthy. Preparedness plans must be developed at all levels. Smart touristic cities that use communication and information technology can enable people to protect themselves in the tourism mobility sector through responsible behavior which provides access to information through digital means in regard to borders and travel, tourism establishments, safety and health conditions in their intended destination. Tourists need such information to plan their travel while on vacation. In addition, they need to be reassured that the current public health and safety rules are well implemented, with technologies and digital data playing an important role in fighting this pandemic. Mobile applications can enhance contact-tracing strategies and support public health authorities in monitoring and controlling the spread of the virus. In addition, artificial intelligence and robotics can help monitor physical distancing in line with data protection law to facilitate disinfection, particularly in regularly overflowing tourist areas [(1)]. Therefore, organizations within the tourism mobility system need to develop strategies that help shape the future, arrange for options to face the different circumstances, and provide insurances in the event of unexpected setbacks.

Research Problem:

Since the post-Coronavirus (COVID-19) world unfortunately will not look the same as before, organizations in the tourism mobility system need to develop strategies that help shape the future, arrange for options for responding to various outcomes, and provide insurance in the event of unforeseen setbacks.

Research Objective:

This study aims to:

- Develop pandemic resistance strategies that provide alternatives for responding to various changes and offer solutions in case of unexpected setbacks by devising integrated indicators for the smart touristic city to fight pandemics in the urban mobility sector.
- Review the literature on smart and flexible urban tourism mobility and map for Coronavirus (COVID-19) examining the most appropriate responses of mobility policy makers and service providers in the post-COVID-19 era.
- Determine possible opportunities to benefit from this pandemic crisis, analyze some examples of touristic cities that have proven successful in pandemic periods, and find smart and flexible strategies that apply to the urban tourism mobility sector and are more human-focused.

Research Methodology:

The study follows the deductive analytical approach where the researcher relies on starting an analysis of the Coronavirus (COVID-19) pandemic crisis, its impact on tourism mobility and its patterns and the potential impacts on the medium and long term. It studies the most appropriate strategic responses to the tourism mobility policy in the post-Coronavirus (COVID-19) era and identifies possible opportunities to benefit from it. Then, it explains the literature on smart and resilient cities, since the smart city planning standard takes into account the perspective of resilience by establishing tools or guidelines for measuring resilience through which different crises are addressed in order to find smart and flexible strategies that can be applied to the human-focused urban tourism mobility sector.

1. Cities at crisis: consequences of Coronavirus (COVID-19) Pandemic:

Coronavirus is threatening cities around the world in an unprecedented way. Since its outbreak in Wuhan, China in December 2019, globally confirmed cases of Coronavirus (COVID-19) have exceeded 1 million in three months with an approximate mortality rate of 4-5% of cases. While Coronavirus (COVID-19) may not be as fatal as some other previous pandemics such as SARS, Ebola and Middle East Respiratory Syndrome, its transmission rate is much higher, which poses a greater challenge to the dense urban areas of the world, especially those with poor infrastructure and services. Besides its impact on public health, the Coronavirus (COVID-19) pandemic has multifaceted economic impacts such as the mobility demand. (Fig .1) [٢].

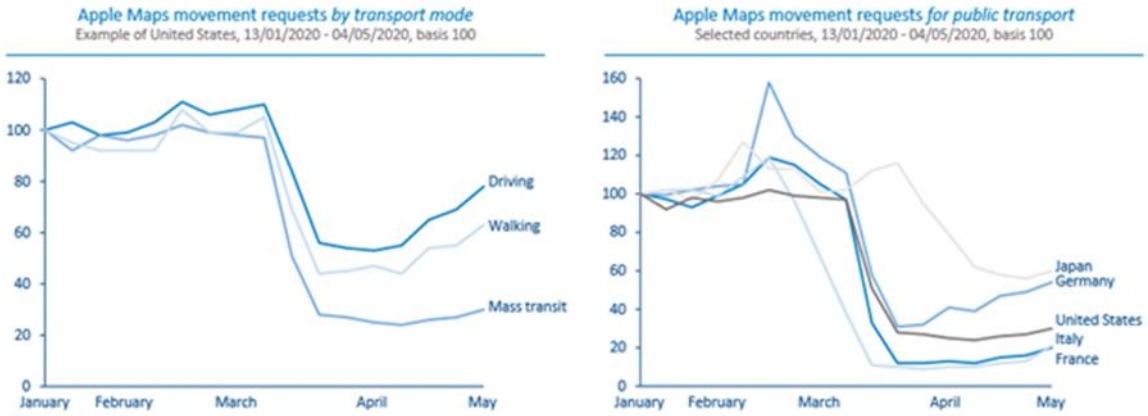


Figure.1: Reduced mobility demand by transport mode and by country during the Covid19 crisis [3].
Data sources: Apple maps mobility trends report (2020).

1.1. The dramatic fall in tourism affected by Coronavirus (COVID-19) pandemic:

Due to the spread of the pandemic and the fears of tourists, international and domestic flights have decreased to nearly zero. The rate of departure of daily flights from airports in various main and sub-regions suddenly decreased during the second half of March. Thus, an inverse relationship has grown between the increase in the number of cases and the number of daily flights (Fig .2) [4]. Since April, most of the remaining flights have been for cargo or humanitarian purposes. With the spread of the pandemic around the world, the number of passengers decreased to almost zero by mid-March 2020.

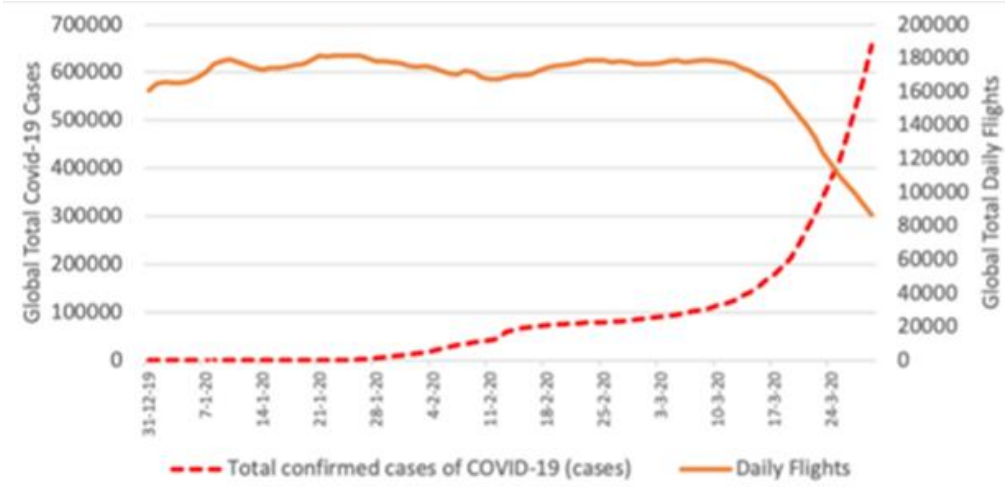


Figure. 2: Daily global COVID-19 cases and global flights
Data sources: ECDC (2020), FlightRadar24 (2020).

1.2. The impact of Coronavirus (COVID-19) pandemic on Global Tourism Mobility:

Our life has been put on pause; Public authorities in all countries have responded to the Coronavirus (COVID-19) crisis by calling on their citizens to reduce their movement to a strict minimum to reduce the risk of transmission. More than half of the world's population is subject to directives or advice on house arrest. As a result, public transport, road traffic, even pedestrian, and daily and tourist use have fallen to record low levels - even in places where there are no instructions to stay home [٢].

1.2.1. Changes to toristic destinations:

It is clear that Coronavirus (COVID-19) crisis will change the way of moving around cities and neighborhoods. Google data provide information that can be used to investigate the impact of Coronavirus (COVID-19) on different regions and groups with different destinations, revealing how much mobility and tourism have been affected in these destinations so far.

The percentage of change in excursions to retail and recreation decreased by 40--65% from baseline in all regions. In March 2020, Europe faced its strongest falls. The impact of Coronavirus (COVID-19) on retail and leisure travel varies by income group. The data for moving to parks also shows a great diversity between different regions due to the restrictions associated with Coronavirus (COVID-19) and the impact ranged relatively (between 30 and -40%) by the end of March 2020 [(5)].

1.2.2. Tourism urban mobility as an effective vector of the epidemic:

Mobility has enabled people and things to create a global transportation network that is making the world smaller every day. The pandemic has spread in the global and local transmission pattern. First, it spread with physical interactions in cities and towns via local transportation networks. Then, it spread globally through international air travel and then locally again. As pathogens have the ability to travel on buses, trains, and any sort of puplic transportation, the spread the infection will certainly increase more easily. The study shows that 9 passengers were infected on a long-distance bus travel in Hunan in January [(5)] (Fig .3).

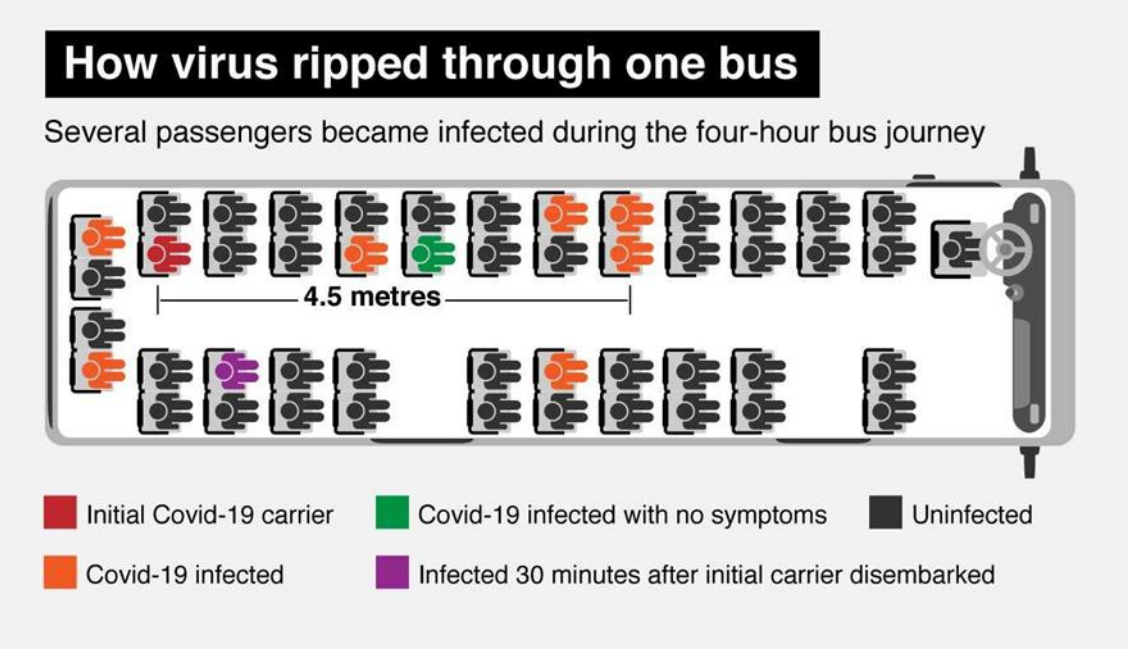


Figure 3 - How COVID-19 spread through a Hunan bus
Source: "Impacts of COVID-19 on Mobility Preliminary analysis of regional trends on urban mobility"

1.2.3. How can coronavirus (COVID-19) pandemic affect tourist behavior?

Recent studies and behavior analysis have shown that the Coronavirus (COVID-19) health crisis affects consumer patterns. It is observed that changes in the short term (for example during closure and lockdown period) have increased sales and online services significantly which is expected to continue on the medium or long term. The intensity of international

travel in the post-Coronavirus (COVID-19) crisis is also expected to be lower, compared to the period before the crisis [8].

In regard to the next summer vacation, recent surveys, conducted between April and May 2020, revealed that there is still willingness to travel after the Coronavirus (COVID-19) lockdown. However, when choosing a travel destination, places with lower tourist density and better health conditions are largely prefered. Therefore, it is clear that price is not the main criterion that influences the choice of the place of destination. However, tourist activities that allow the enjoyment of nature and the outdoors are more significant in addition to the higher preference for destinations less affected by Coronavirus (COVID-19). Furthermore, changes in journey times are taken into account, i.e. making shorter or same duration travels but divided into several smaller trips, especially when traveling by car (the preferred mode of transportation during an outbreak). Nonetheless, holiday household budgets are also likely to be lower due to economic uncertainty and instability [8].

2. The crisis and opportunity - to consolidate urban resilience.

This pandemic represents an opportunity to rethink our tourism priorities. There should be no choice between the economy and daily life. In the field of tourist mobility, it is technically and economically possible to make this beneficial for everyone as it is necessary to change this collective behavior. Being in the middle of one of the greatest if not the most important jumping scenarios, it is the right moment and opportunity to develop more resilience and fair future systems.

It is necessary to bear in mind that the Coronavirus pandemic is just the beginning of other crises in the current era of uncertainty. Therefore, more efforts need to be exerted to activate urban resilience as the only way out of these crises.

2.1. Smart Resilience Paradigm as a defensive line to the Corona crisis:

A smart city is a municipality that uses information and communication technologies (ICT) to increase its operational efficiency, share information among its residents, improve the quality of services, and achieve the well-being of citizens. While the exact definition varies, the overarching mission of a smart city is to improve city functions and drive economic growth while improving the quality of life for its citizens using smart technology and data analysis. A smart city takes its value based on the technology that its users and residents benefit from, not just how much technology is applied. The smart city planning criterion takes into account the resilience perspective. [٩] It established tools or guidelines for measuring resistance by which the city's resilience and the framework for its implementation can be assessed.[١٠]

2.2.characteristics of the resilience system

Resilience means faster recovery from stress, more stress tolerance, and less susceptibility to a certain amount of stress. "Stress" can mean either a chronic difficulty or an acute crisis. In other words, to be resilient is to endure major disruption without change, disintegration or permanent damage and quickly return to normal [12] while reducing distortion in the face of these pressures.

The main characteristics of the resilience system are shown in Table (1).

Characteristics	Description
Adaptive capacity	Equipping urban systems to deal efficiency with slow and radical changes
Self-organization	The process of internal organization within a system without being guided or managed by an outside source.
Transformability	Having the capacity to create a fundamental new system when the ecological, economic and social conditions make the existing system untenable.

Table (1) Characteristics of a Resilient System [12]
Source: The Rockefeller Foundation

2.3.Resilience in the Urban Mobility Sector

A resilience transportation system is one that promotes safe, equitable, and inclusive accessibility by providing sustainable, integrated, flexible, and robust mobility options – during normal times and times of crisis. [1] Mobility systems that are designed in a highly integrated way have inherent flexibility for their users, as travelers have multiple options for planning their journeys. However, transportation infrastructure can also provide flexibility in terms of multiple uses of transportation assets, especially during times of disaster. A multi-modal hub could provide somewhere to shelter during a storm, or a cooling or water center in times of extreme temperatures. Finally, "robust," means a system that is designed, operated, and maintained with known environmental, social, market, and demographic risks in mind, and therefore is able to fail safely, or minimize failure as a whole. [15]

2.4.Disruptions to a mobility system

Disruptions to a transportation system can be characterized in two dimensions: frequency of occurrence and level of damage. In this way, as illustrated in Fig. (4), disruptions to a transportation system can be classified into three categories: disasters, day-to-day variations to demand or capacity and ongoing long-term changes happening in the background. Disasters do not happen very often; however, when they do, they may cause severe damage to the system, which can take very long time to recover. [16] To respond to the three categories of disruptions, a resilient transportation system must have three qualities; (1) to recover efficiently from disasters, (2) to be reliable in terms of network connectivity and travel time reliability, and (3) to be economically, environmentally and socially sustainable. Note that following the concepts of "resilience thinking", here recovery

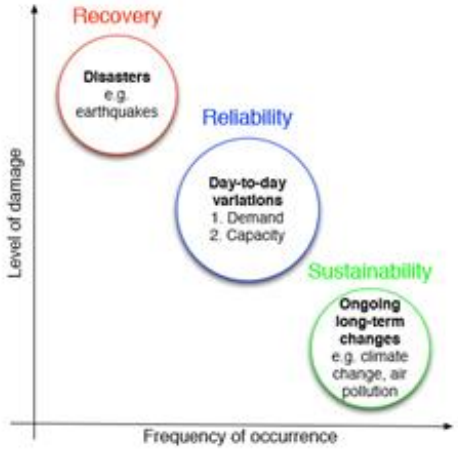


Figure (4) classification of Disruptions to a mobility system [16] Source: Resilience thinking" in transport planning

includes both the possibilities of the system to return to normal, i.e. pre-disaster condition, and alternatively, to be rebuilt or transformed to a completely different system. [16]

3. The Smart Resilience strategies for the urban touristic mobility sector dealing with Coronavirus (COVID-19):

The mobility ecosystem is currently focused on responding to Coronavirus (COVID-19) pandemic, with priority given to staying safe and protecting lives while managing tourism. In this respect, resilient cities and countries are believed to globally implement a large number of measures in the area of mobility, especially for tourist travelers, to prevent the spread of Coronavirus (COVID-19). Meanwhile, the objectives of flexible mobility need to be highlighted in order to create a better understanding of possible measures to overcome the pandemic. Thus, actions have been arranged according to Avoid-Shift-Improvement, Fig. (5) [6]:

1. **Avoid**: Measures to reduce the demand for mobility - in the short term, to combat Coronavirus pandemic, prevent the spread and limit mobility severely.
2. **Shift**: Measures to direct users to safe, clean, and less connected means of transportation, focusing on social distancing, in the second wave of the Coronavirus (COVID-19) crisis in the long term, promoting active forms of mobility such as walking, cycling as well as attractive, reliable and affordable public transportation to keep cities livable.
3. **Improve**: improving the quality of mobility, activating flexibility to be more resistant and responding to any unexpected future events and developing an implementation strategy.

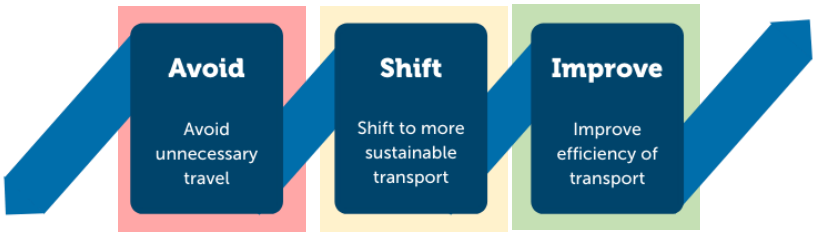


Figure 5 – Avoid Shift Improve – resilience strategy @ COVID-19, Source: TUMI Initiative

3.1. Near-term pandemic responses with mobility restrictions (Our way of life has been put on pause): (AVOID STRATEGY)

The pandemic has spread in the pattern of local and global mobility. First, it spread with physical interactions in cities and towns via local transport networks. Then, it started to spread globally through international air travel and then again locally. Governments have responded with travel restrictions and bans to reduce the spread from one country to another. Moreover, they have done local measures such as minimum social distancing (about two meters) between poeple, staying in place (staying home and only going out when necessary) or mandatory curfews and lockdowns. These mandatory restrictions are imposed in an attempt to "flatten the curve" in the sense of reducing the infection rate and escalating mortality.

3.2. Sustained mid-term impact confronts the Coronavirus (COVID-19) pandemic crisis: (SHIFT STRATEGY)

These measures are taken to reduce the individual demand for transportation that is beginning to increase for fear of overcrowding. Such measures are taken in the short term to combat the Coronavirus pandemic and in the long term to reduce carbon emissions, accidents and congestion. They are often carried out in times of crisis as a catalyst for innovation. Mobility is no exception, and innovation is required to keep operations running while ensuring the most appropriate health conditions for passengers.

Driven by a sense of urgency during the pandemic, several innovative initiatives will be introduced with the aim of increasing mobility. Bearing in mind that part of these innovations will have a rapid impact on recovery and increase the resilience of the system. Thus, they should continue in the post-Coronavirus (COVID-19) world.

The following Diagram provides an overview of adjustments that can be made to the operating model in the tourism mobility sector during the pandemic, or that are being considered to increase resilience in the future.Through increasing health and insurance measures and establishing them in the various elements of the mobility system to ensure the quality of service for tourists and to maintain precautionary measures to prevent the spread of the pandemic, The research has limited the elements through which the mobility system can be managed as follows, Fig. (6):

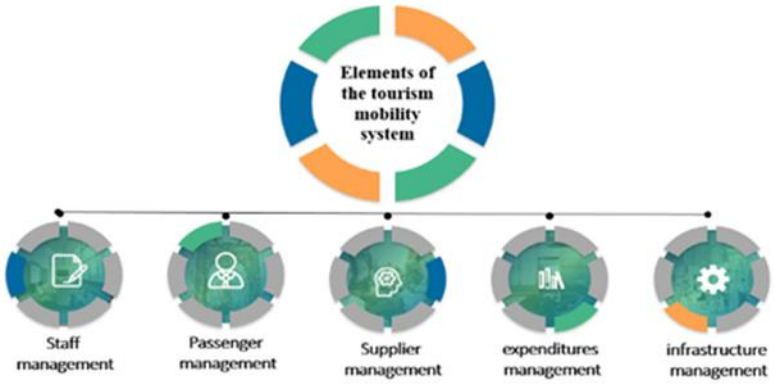


Figure.6 Elements of the tourism mobility system source: The Researchers

3.2.1. Protection of Staff:

A) Information: Employees should be well informed and aware.

B) Training: how to properly disinfect facilities and surfaces.

C) Provision of protective equipment and disinfection.

D) Health check-up.

E) Closing the front door / not selling tickets by the driver / electronic tickets.

F) Service places such as canteens and cafeterias must be well managed. This can include extended serving hours and requirements to maintain distances of at least two meters while waiting and eating.

3.2.2. Protection of Passengers and Tourists:

Passenger protection is not a measure of well-being, but it is also an important measure to maintain people's confidence in the means of mobility. Therefore, these measures have to be effective:

A) General information: Passenger information about standards of behavior can be disseminated through various channels.

B) Risk information: Transparency is the most important aspect of dealing with crises. In other words, in the event that any traveler becomes infected with Coronavirus (COVID-19) and uses transportation, the local government and public transport service provider should do their utmost to provide comprehensive information about the risks and to track people's activity.

C) Schedule adjustments: some cities and transport operators such as BVG in Berlin have revised their transfer schedules. Direct and transparent communication (such as social media) should be communicated to passenger schedules. Fig. (7).

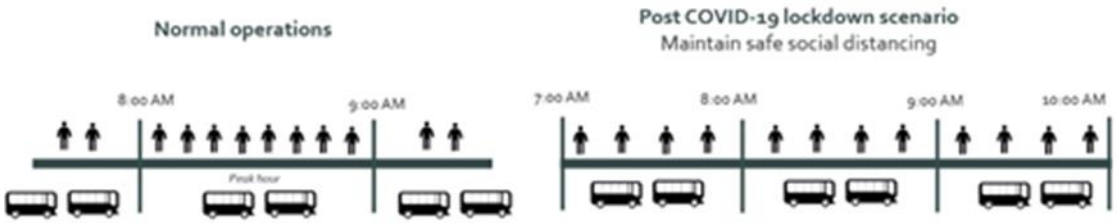


Figure.7: Peak Passenger demand needs to be reduced by adopting staggered working hours for offices/markets/work places Source: TUMI Initiative

D) Cleaning and disinfection

E) Greater space and physical distance: Implement measures that increase the distance between passengers to reduce the risk of infection. This can be done by increasing the frequency of transportation and is requested to reduce the occupancy rate of large mobility vehicles to a maximum of 50 percent, Fig. (8).

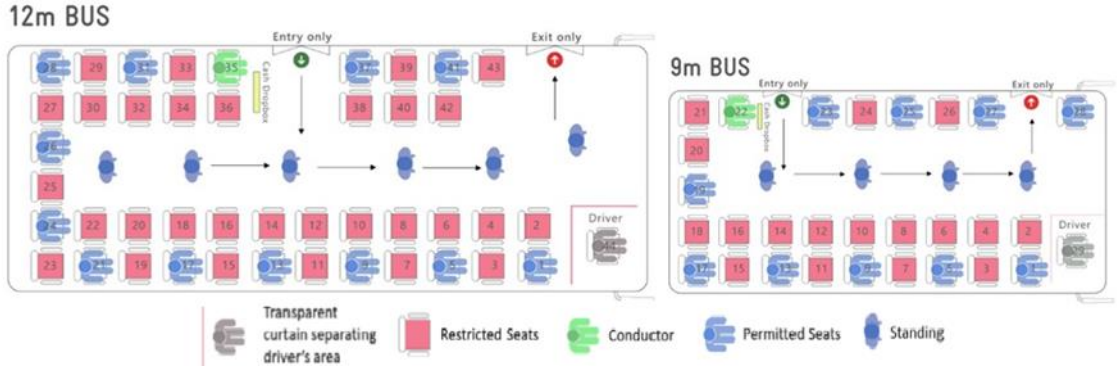


Figure.8: Typical layout of 12m (standard) and 8-9m (midi) bus, marking passenger location, unidirectional movement, seating of conductor and location of cash drop box Source: TUMI Initiative

3.2.3. Asset management

A) Cleaning measures:

- Raising the quality of cleaning in group mobility and shared mobility patterns.
-Automated deployments and devices.

B) Entertainment - car parks are used as a car cinema.

3.2.٤. expenditures management

A) Re-planning investments: reviewing investment plans in light of the expected reduction in financing.

B) Prioritizing investments and not prioritizing investments in road infrastructure, giving higher priority to investments in equipping emergency networks to prioritize capacity improvement within existing infrastructure (for example, signals) versus investments in network expansion.

3.2.٥. infrastructure management "emergency cycle lanes"

Many cities have rapidly redirected streets and infrastructure to provide a safe room for pedestrians, cyclists and other forms of active mobility. These emergency cycle corridors shown in Fig. (9), which are also "Corona corridors," act as safety valves that make essential travel possible and safe for IDPs from shared mobility [18]. Emergency corridors are deployed quickly, sometimes overnight, by using temporary lane markers Fig. (10).

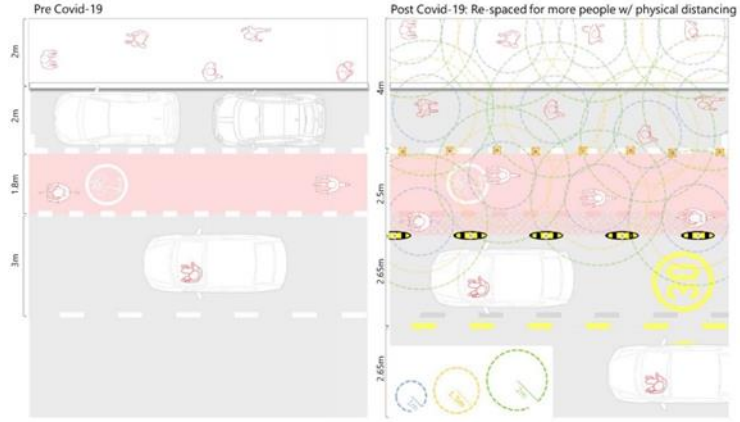


figure.9: emergency cycle corridors [18]

Figure.10: bolldars and protections [18]

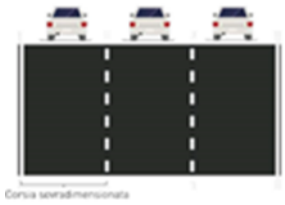
Source: Piano di azione per la mobilità urbana post Covid

Technical manual for the creation of an Emergency Mobility Network:

- **Operational methods of implementation:**

Once the Emergency Mobility Network or the individual corridors have been identified cartographically, it is a question of proceeding with the temporary transformation of the roads in order to recover the space necessary for smart means and modes of transport, or anything that reduces the level of congestion of the ordinary network. Therefore, small and sustainable solutions are needed for the Resilience Emergency Mobility Network to be obtained in various ways table 2:

The Emergancy Mobility Soluotions	Action Taken	Before	After

Resize The Lanes	In Large Cities, There Are Oversized Vehicle Lanes That Encourage High Speeds And Double-Row Parking. By Reducing Its Width, It Is Possible To Create Spaces For Micro-Mobility Without Reducing Flows.		
Creat The Rme	This Is A Series Of Examples Of The Most Common Roads In Which One Can Immediately Intervene In The Construction Of Corridors For Micro-Mobility	 	 
Traffic Moderation	In Predominantly Residential Streets, It Is Possible To Intervene With Traffic Moderation Tools And Road Space Sharing, Without Resorting To The Creation Of Reserved Lanes.		
Pinch Point	Artificial Bottlenecks Built On The Carriageway In Such A Way As To Force The Passage Of Alternating One-Way Traffic.		
Car Transit Interruption	Planters Or Bollards In The Center Of The Roadway Prevent Cars From Passing		

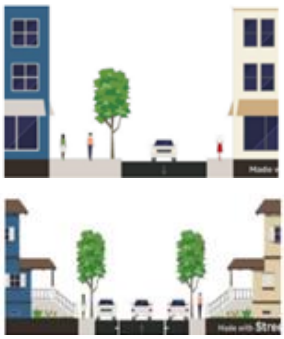
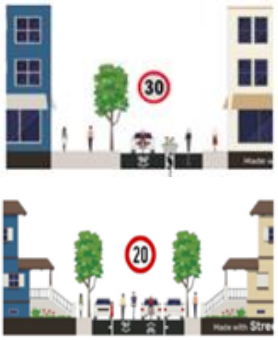
Improve Pedestrian Traffic	It Is Important To Guarantee Social Distancing Even In Pedestrian Spaces. Therefore, It Is Advisable To Free Them From Parking And, When Necessary, To Expand Them With Tactical Urban Planning Interventions. * Extending The Very Narrow Sides And Creating Pedestrian-First Roads.		

Table (2) various ways of for the Resilient Emergency Mobility Network, source: The Researchers

3.3. Longer-term "adaptive resilience strategies for urban tourism mobility sector" (IMPROVE Strategy) the New normal:

Regardless of when the Coronavirus (COVID-19) scenario is resolved, there are deeper implications for tourism mobility - with the potential for long-term shifts in supply and demand.

Demand patterns will change, as this pandemic encourages an increase in environmental sentiment along with the calming experience of travel. Coronavirus (COVID-19) pandemic will force people to rethink their need to travel - and to travel in slower, more environmentally conscious ways and means for their safety and health [١٩].

3.3.1. Touristic mobility model shift:

Tourist areas and tourist travel paths should be designed to accommodate all users and their health concerns in an age of uncertainty. Street design should adequately accommodate all street users, including pedestrians, cyclists, transit users, motorists, and commercial vehicle drivers, and organize mobility in a resilient manner. Fig.11 illustrates the necessity of assessing the current mobility situation to transform into a flexible scenario. Although not all streets can accommodate all users equally, the style of travel must be designed well with context and purpose in mind to provide traffic space suitable for all street users. Fig.12 shows the inverted transport hierarchy.

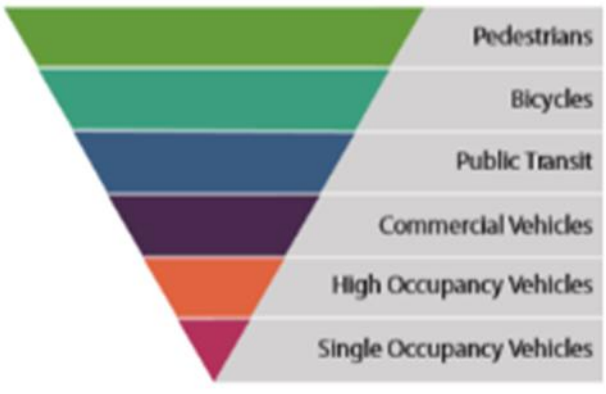


Fig.11 Up side down Mobility Hierarchy source: U.S. Department of Housing and Urban Development.

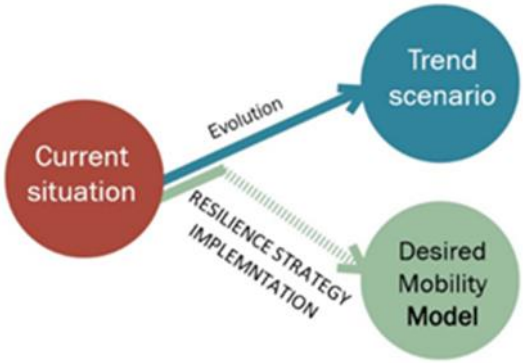


Fig.12 mobility model shift Source: Urban mobility plan of Barcelona PMU 2018

3.3.2. The Superblock Concept and the Change in the touristic City Model:

"Superblock" is defined as "a new mobility model that restructures the typical urban road network. Physically, the city consists of large squares of a network of primary roads forming a polygon. The interior (across the road) is closed to motorized vehicles and above ground parking lots. It gives preference to pedestrian paths in public spaces. Although inner streets are generally reserved for pedestrians, they can be used by emergency vehicles and loading / unloading vehicles under special conditions. Perimeter, or outside, Superblocks is where an automatic passage rotates, forming basic methods. Fig.13 illustrates the differences in usage between the dominant model of urban mobility for single use and the model of uses and multiple functions of large blocks [21].

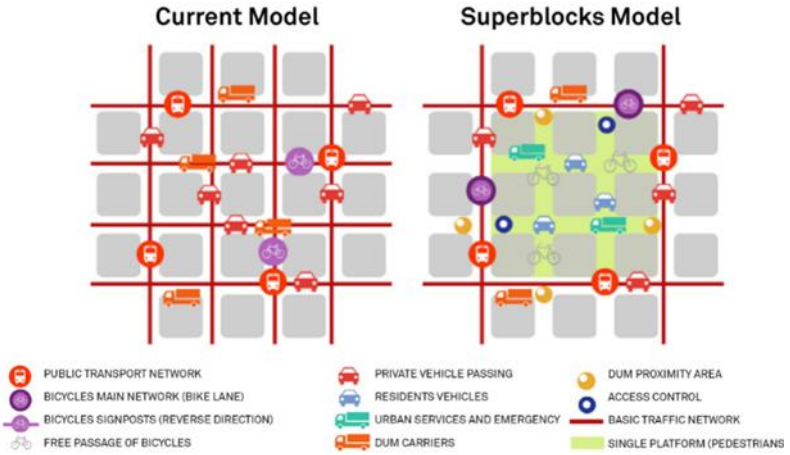


Fig.13 Differences between the single use model of urban mobility and the Superblock model.
source: Urban mobility plan of Barcelona PMU 2018

3.3.3. Resilience Strategy in model Hierarchy for smart mobility:

In light of the chosen smart model to activate resilience through smart cities mobility, the following elements can be determined as in table (3):

Table:3: mobility model factors source: The Researchers

This review examined the 15 sets of resilience indicators found in international frameworks. The scope was an understanding of the indicators of flexible mobility. The analysis showed that:

1) Each framework is strongly influenced by its conceptual entry point

2) There is a clear gap between resilience theory and the way in which indicators focus on well-being and general development factors

The frameworks differ in the number of indicators (from 12 to more than 50), which were compiled and calibrated in light of the frequency of factors in them. The most important elements of flexibility that serve the strategy to be developed, which is based on protecting users and their requirements in an age of uncertainty, have been summarized. The factors for consolidating flexibility in smart mobility have been enumerated as follows: Figure 14:

MOBILITY MODEL						
MOBILITY ELEMENTS					ENABLING FACTORS FOR MOBILITY	
Byfoot mobility	Bicycle mobility	Public transportation mobility	Urban distribution of goods	Private transport mobility	PARKING	TRANSIT POINTS

Figure 14: composed extracted factors of Resilience smart mobility, source: The Researchers

3.3.4. Implemntation of Resilience Strategy in Model Hierarchy for Smart Mobility:

By activating the resilience elements previously abstracted through the mobility elements in the chosen smart model, it is possible to obtain a resilience strategy for smart human-centered mobility that can address unexpected crises in an era of uncertainty. Figure 15.

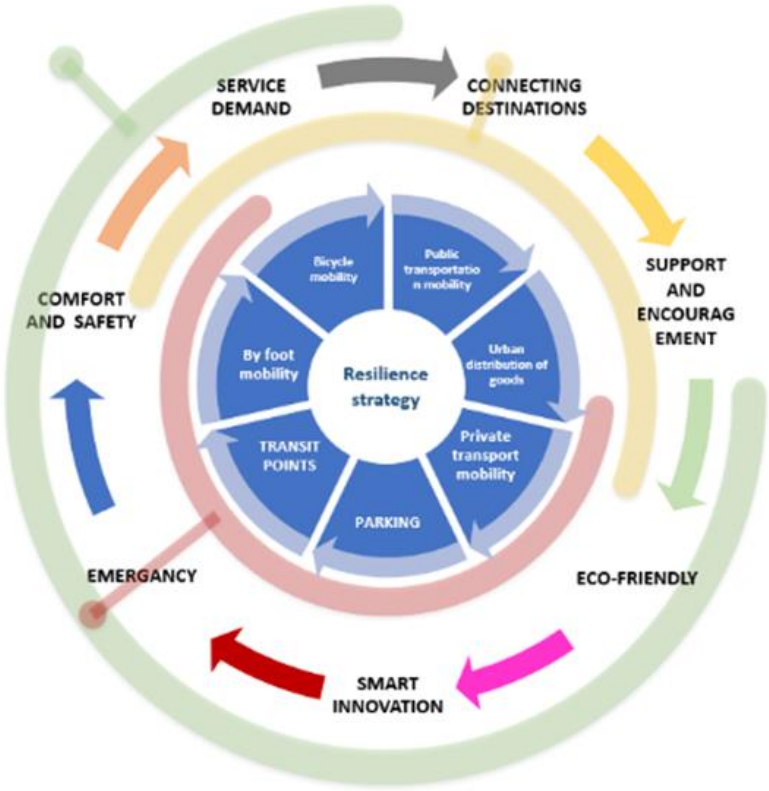


Figure 15: composed extracted resilience Strategy for mobility in Smart touristic cities arranged actions, according to avoid-shift-improve source: The Researchers

4. Conclusion and Recommendations:

Cities are the product of a continuous interaction of forces, some are long and static while others are sudden and violent, such as the Coronavirus (COVID-19) crisis. This early analytical study illustrates how passenger mobility trends have been affected in urban environments since the first weeks of the Coronavirus (COVID-19) pandemic. This analysis confirms what can be observed in many cities around the world today. The most obvious impact is the drastic decline in tourism and tourism mobility. Nonetheless, recovery efforts should be planned based a major principle which calls for making current choices commensurate with the future needs.

A resilience urban strategy is divided into three stages; (the Avoid phase: which focuses on stopping movement and preventing exit so that the pandemic could be controlled), (The Shift phase: which is based on making safe emergency corridors through which tourists can safely travel), and (Improvement phase: which is based on the work of a resilience strategy for smart cities urban tourism mobility, through which it is possible to ensure a flexible urban future that is resistant to crises in this era of uncertainty).

According to the literature review and the analytical study of integrating the seven elements of urban resilience into the smart urban mobility factors of the Superblock model (as shown in Figure 15), the study has been designed to develop a new list of 32 composite indicators of human-centered resilience and crisis avoidance in the sector of Smart mobility. These

indicators adopt common goals to achieve resilience as a new theoretical basis consisting of seven main objectives. Table (4) shows the composite indicators, targets, and selected sectors.

Resilience Objectives & Goals		
Resiliene Objectives	Symbol	Indicators
A.Comfort And Safety	A.1.	Safety
	A.2.	Security
	A.3.	Healthy
	A.4.	Fair
	A.5.	Reduction Of Poullution
	A.6.	Satisfaction With Public Transport
	A.7.	Mange Behavior
B.Service Demand	B.1.	Daily Trips
	B.2.	Availabilty
	B.3.	Accessability
	B.4.	Reachabilty
C.Connecting Destinations	C.1.	Access To Public Transport Stops
	C.2.	Access To Jobs And Services
	C.3.	Compact
D.Support And Encouragement	D.1.	Information
	D.2.	Affordability
	D.3.	Incentives
E.Eco-Friendly	E.1.	Emergency Consumption
	E.2.	Noise Reduction
	E.3.	Co2 Emissions
	E.4.	No2 Concentration
F.Smart Innovation	F.1.	Inteligent Infrastructure
	F.2.	Smart Objects
	F.3.	Machine-To-Machine (M2m) Communication
	F.4.	Internet Of Things
	F.5.	Smart Energy Mangement
	F.6.	Mobility Apps
	F.7.	Process Innovations
G.Emergancy	G.1.	Roubstness
	G.2.	Redundancy
	G.3	Resoursefulness

	G.4.	Rapidty
	G.5.	Adaptive
	G.6.	Self-Orgnaization
	G.7.	Transformability

Table.4: list of resilience smart mobility indicators, source: The Researchers

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