Smart mobility: a comparison between the social media strategies for the public urban mobility services of Rome and Bucharest

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Abstract

The rapid development of cities, along with the growth of urban population, has brought up many challenges for the organization of human urban mobility in the most sustainable and smart way. The high need for modern arrangements of citizens' movement leads to the necessity for searching alternative solutions to develop urban transportation systems and increase satisfaction of passengers, as well as modern and

user-friendly social channels to provide always updated and useful information to citizens and visitors, at any time and in any place it is required. ***Objectives*** *The main objective of the paper is to analyze to what extend social media platforms stand in as a communication tool for public transportation companies and increase engagement of passengers to the process of mobility systems development, making them active members of a community of information consumers and producers.* ***Prior work*** *The role of social media platforms in urban mobility and the level of satisfaction of citizens with urban mobility services was recently studied by several scholars. However, such a comparative study on two European capital cities concerning this specific topic of interest lacks in the existing literature.* ***Approach*** *This paper presents a comparative analysis concerning the social media strategies of public transportation companies in the urban environment. Empirical analysis is based on two case studies shedding light on the level of development and engagement of passengers on social media platforms in Rome and Bucharest. For this comparison, the collected data were analysed through the SWOT analysis tool in order to clearly highlight the findings and compare the results.* ***Results*** *Our evidence shows that social media platforms should be used by transportation companies to provide two-way communication and use a customers' feedback as a source for continuous improvement of services and facilities, to be in line with citizens' demands and technology providers. Moreover, beneficiaries being interested to identify a higher level of responsibility.* ***Implications*** *The rapid growth of social media platforms creates various possible future scenarios for the customers' involvement. Certain gaps in the development of social media strategies in these two cities can become a possible direction for their further evolution in the scientific research as well as for policy making practices.* ***Value*** *The analysis of social media platforms has shown the main growth points for further development of smart mobility in Rome and Bucharest.*

Keywords: *smart city, smart mobility, sustainable urban development, social media platforms, innovative business models.*

1. Introduction

The world is in a rapid process of urbanization. It is estimated that over 50% of the planet's population lives in cities, and by 2050, approximately 70% of people will live in cities [1]. Cities are attractive for people looking for job security, stability and comfort. There are plenty of business and commercial activities, as well as public services, such as hospitals, schools and university centers in the urban areas. Because of this, they are experiencing accelerated population growth. One of the main problems of cities is how to sustainably and intelligently organize the mobility of city dwellers.

Within cities, one can identify the culture of a population especially based on urban design that reveals the evolution of the city from the historical past to the present. Cities are also an important element in tourism, because they attract visitors from all over the world due to their customs and culture. Technological

advancement has led to the emergence of solutions that solve certain technical problems in everyday urban life. At this moment, the cities are full of sensors with different functions, for regulating the time of lighting the street lights, for regulating car traffic, for security issues.

Rapid population growth, as well as high demand for infrastructure and other resources have led to urban planners, and policymakers need to find new solutions to the challenges of accelerating urbanization. While the challenges of cities remain varied, from inadequate sanitation, drinking water supply, adequate transportation, availability of green spaces, managers propose the adoption of smart solutions to the challenges of cities. A different approach was observed regarding the use of state-of-the-art technology for managing challenges in cities and improving the quality of life, as a precondition for creating smart cities [2].

Smart mobility is in a process of expansion due to the development of smart cities. Due to theoretical and practical approaches, co-productive approaches can be identified, generally in sustainable transdisciplinary projects, which allow the exchange of knowledge from a social point of view to generate effective solutions to complex problems facing the real world [3].

Recent approaches to the intelligence paradigm face problems in answering the question of how a system can be transformed from existing analytical structures to new ways of urgent development in the efficient allocation of available resources. In recent years, there has been a shift from technology-focused solutions to intelligence, to society-oriented perspectives, where goals and requirements are integrated into a variety of processes [4]. These concepts of intelligence try to combine different aspects of sustainability with new digital technologies [5].

Widespread access to the Internet, as well as the development of ITC, have led to new ways of communicating. The need to create social connections were met through the use of online tools, respectively communication platform. They allow the creation of messages and their publication in online environments, so that Internet users can be creators and providers of messages, not just consumers and recipients. In the early 2000s a new communication model that is based on users' creative content, known as Web 2.0 [6] was characterized by information exchange tools as well as social platforms. Nowadays, communication is dominated by services that are able to integrate many forms of content distribution, respectively social platforms that are accessed by many users. Due to accessibility, communities and institutions use this type of communication, because they can be implemented quickly. Social platforms were anticipated by Alvin Toffler [7] and are seen as "gatherings of the future".

Social networks are one of the main communication platforms and are growing. According to global and local statistics, Italy has a population of 60.51 million inhabitants, an urbanization rate of 70%, 80.40 million mobile phone connections, 49.48 million Internet users, representing 82% of the total population and 35 of millions of inhabitants who are active on social media, which represents 58%. The main social network accessed by the inhabitants of Italy is Facebook, with 29 million users, followed by Instagram, with 20 million users, Linkedin with 14

million users, Twitter with 3.17 million users and Snapchat with 3.05 million users[8].

Romania has a population of 19.53 million inhabitants, a degree of urbanization of 54%, 26.88 million mobile phone connections, 15.04 million internet users, which represents that 77% of the total population of the country uses the Internet, 11 million people social media assets, respectively 56% of the population and 9.8 million mobile social users, which represents 50% of the total population. The main social network is Facebook, with 10 million users, Instagram with 3.8 million users, Linkedin with 2.6 million users, Snapchat with 1.4 million users and Twitter with 0.3 million users [9].

In order to offer a high degree of both citizens and visitors satisfaction, public transport companies must adapt to the new mobility behaviours and digital social channels. Consistently with the aim of understanding how modern European municipalities are currently addressing this important issue, our research highlights the impact of social networks on the development of communication within public transport companies in Rome and Bucharest.

Consequently, the main research questions of the present study are:

- *What are the main contact points that characterize the socialization strategy of urban mobility services in Rome and Bucharest?*
- *To what extent do Italians and Romanians interact with Urban Mobility Services' social media channels?*
- *What is the level of satisfaction of the citizens of Rome and Bucharest with public transport?*

2. Brief literature review

To address the main problem of the paper we conducted a brief literature review in order to bring to light the main issues of smart urban transportation, the role of social media in it and its impact on the satisfaction of the citizens. Despite the fact that the first studies on the urban transportation appeared several decades ago [10-12], the role of social media in urban transportation was not an issue until recent years and has become popular with the development of social media services.

Recent studies on smart urban mobility have indicated the main current trends in cities' development that affect urban transportation, among them are: growing of urban population, the rising number of public transport, aging population [13-14].

Several systematic literature reviews on various topics of smart mobility were conducted in recent years. A group of scholars [15] have studied the role of Intelligent Transport Systems (ITS) for people and freight transport and its impact on smart mobility, another group of researchers [16] carried out a bibliometric analysis in order to identify the main trends in smart urban transportation. Among their findings – a rising interest among scholars for the topic in the recent years and especially among Computer Science and Transportation Science Technology researches. Butler et al. (2020) [17] in their systematic literature review on the aptitude of smart mobility to moderate transportation disadvantage have created a

conceptual framework and have revealed the main smart mobility innovations discussed in the literature, their application and future potential. Among other dimensions of transportation disadvantages, the author outlines psychological and information dimensions that refer to the barriers of citizens associated with their safety, perception and their acquaintance with urban transportation.

Big IT and transportation companies also make a contribution to scientific literature by studying smart mobility issues. Hitachi in its research on smart mobility for smart cities [18] sees the development of smart mobility as a possibility to promote more sustainable society. Hitachi has studied mobility concept and outlined "5 layers of transportation functions": transportation user experience, transportation services, information collection, information management and control, transportation company coordination. The authors propose three types of optimization and control for urban transportation. Fujitsu's approach [14] is based in three pillars – "personal mobility", this means the development of balanced combination of private and public mobility; "safe and secure mobility", that is aimed at decrease of traffic accidents and "pleasant mobility", this includes the development of telematics systems for urban transportation.

The overcoming of these barriers by means of social media is deeply intertwined with the development of IT technologies. As it is appears in the scientific literature, the role of IT innovations to solve urban transportation challenges is of high importance. Several scholars studied the importance of Internet of Things (IoT) technologies in smart urban mobility from different perspectives [19-22].

The role of social media in urban mobility was recently studied by several scholars [23-27]. Several case studies on the application of social media tools for urban mobility in European countries were recently explored [23, 28-30] .

One of the research questions of our study is connected to the level of satisfaction of citizens by public transportation systems. Since the main field of the study is smart dimension of public transport we found it useful to examine the scientific papers on the level of satisfaction of the citizens of smart cities and their perception of smart urban initiatives. Several studies were recently conducted in this field [31-34].

The level of satisfaction of citizens with urban mobility services was discussed in the recent scientific literature [35-38].

3.Methodology

Consistently with our aim of developing an evaluation scheme to audit and assess the online contact points and means of communication set by modern European municipalities, the present study presents a multilevel approach [39].

First, it was needed to track the main social media tools that can help citizens and visitors to easily access updated and reliable information about the mobility systems of the cities under investigation (institutional level), by collecting information through the triangulation of several sources (i.e. public reports, newspapers, websites and public databases). In this perspective, the authors decided a set of fundamental online contact points to be analysed and evaluated

through the users reviews: (i) the official website of the managing entity of public mobility services for the municipality; (ii) as per the social networks, it was ensured that both the municipalities had official Facebook and Twitter accounts. Afterwards, the usefulness, accessibility and updating of their contents was evaluated; (iii) the official/recognized mobile applications of the municipality public mobility services.

Moreover, secondary qualitative data - in the form of users comments/posts - were collected thorough the aforementioned online channels to evaluate the overall satisfaction of public mobility users (individual level), in terms of efficiency/effectiveness of the services, level of innovativeness of the services, overall evaluations also compared to the price level of services. This part of the process would allow authors to identify the most important strengths and weaknesses characterizing the urban mobility system and its means of communication. To ensure the higher generalizability of results, the collected data have been codified with reference to the nature of the selected event, by labelling it as a normal working day or reflecting the presence of exogenous factors like strikes, extremely adverse weather, weekends and festivity, lockdowns due to Coronavirus pandemic [40].

In order to answer our third RQ and provide a strong contribution to the literature in this field, this study also run a content analysis of the public posts and comments collected through the selected social media channels. This investigation was carried out based on a sample of overall n.639 records, among public comments and posts on several social media channels. Number, nature and source of the data are detailed in table 1.

Table 1. Data collected through Rome and Bucharest's urban mobility social media platforms

Nature	Source	N. of records
Post	Facebook	7
Comment	Facebook	351
Post	Instagram	1
Comment	Instagram	14
Post	Twitter	109
Comment	Twitter	43
Comment	App	122
Post	Official Web Page	3
Comment	Official Web Page	0
Tot.		Posts = 123 Comments = 516

Next, it was possible to codify the text of the online reviews to identify the most common and significant keywords, corresponding to meaningful indicators of the level of satisfaction about the urban mobility system and its means of communication. To this end,

in order to strengthen the final results and make a strong comparison between the evidence of the two city contexts, the authors analyzed the selected data by firstly open coding the text, and then applying axial and selective coding to narrow the focus for the research purposes [41].

The final step of the methodological approach consists of the conduction of a SWOT analysis, based on the selected urban mobility indicators, in order to highlight both the internal (strengths and weaknesses), and the external perspective (threats and opportunities) characterizing the mobility conditions in the cities analysed. Several studies have recently adopted this analytical tool in the domain of urban mobility research [42-44]. This step allows to clearly compare the two contexts and define the priority areas of intervention that are needed. Indeed, the SWOT analysis tool is suitable to be used for policymaking practices, for defining strategic directions and the implementation of measures towards the fulfilment of efficient and effective urban mobility improvements [45]. This would allow the present study to provide a practical contribution to modern municipal smart mobility management systems.

4. Main results and discussions

4.1. Case study Bucharest

Public transport has a high contribution to reducing energy consumption and environmental pollution. It brings many benefits both locally and regionally. Public transport is one of the main services of public interest that is the responsibility of local authorities.

The quality of public transport services directly contributes to the quality of life of the inhabitants, as well as to the increase of the city's activity from the tourist point of view and to the investments. Public transport services are one of the main activities of the local economy.

The main disadvantages of public transport in Bucharest refer to the poor quality of the vehicle fleet that serves certain areas of the city, the low length of the lanes dedicated to the lack of intermodal centers, and the advantages are low fare compared to other European cities or capitals. The public transport system in Bucharest follows two objects. On the one hand, it must respond to the needs related to the enlargement of the city, respectively the access of the inhabitants to a road and efficient system, and on the other hand, the public transport must respect the European strategies.

From the point of view of respecting public transport, public transport must seek a promotion between mobility, quality of life and economic growth [46], because in urban areas lives or a significant part of the European population [47].

Bucharest is the largest urban agglomeration in Romania with a population of 2,155,240 inhabitants in July 2020 and a density of 8771 inhabitants km2, which represents 13% of the total population of Romania. In the context of the existence of special social and economic opportunities, the real number of the population living, working or learning, in reality, is higher than the registered one.

The passenger transport service in Bucharest and in the metropolitan area has the highest share in Romania as an area of merit and as a number of uses, operates on the principle of continuity and is based on an experience gained in 111 years of

activity for the benefit of the community. It is also a service of general economic interest, as it is based on mobility and access to urban facilities, accessibility to social and health services for all categories of people.

The main economic operator for urban transport in Bucharest and in the metropolitan area is the Bucharest Transport Company STB SA, being created by the reorganization of the Bucharest Autonomous Transport Authority, in September 2018.

The company has one of the largest transport networks in Europe, with a length of 1651 km. The transport network covers an area of 633 km2. The company has about 2000 vehicles (trams, buses, trolleybuses) that make over 700 million urban trips annually. The company has over 11,000 employees [48].

The main contact points that characterize the socialization strategy of the surface public transport company in Bucharest are based on the transmission of information on its own website, on social networks and on the smartphone application. In 2019, 197 information and press releases were published, for direct information of travelers. The site provided information on suspensions or diversions of some routes on the occasion of organizing events in the city, setting up, relocating or changing the name of some stations, supplementing the transport capacity of certain routes, as well as announcements regarding projects in rural areas or various events.

The activity of managing social networks, respectively Facebook, is used for posting press releases, as well as information related to various events conducted by the company or in collaboration with other partners.

The company's Twitter account is mainly used for timely information about all delays, vehicle traffic jams, route changes, as well as for the use of alternative transport routes. In 2019, 1490 informative messages were sent on this social network.

A significant step for the improvement of the transport service was the launch of the INFO STB application in April 2019, which was later renamed INFO TB, is a project developed by the Bucharest Transport Company STB SA. This application can be used by all smarphone owners with an Internet connection. In this application, you can view the routes of all vehicles, you can choose a destination, and the application will show available routes and will choose the fastest route for the desired destination. The journey can start from where you are or from any other point on the map. The application offers access to a transport network with over 1500 vehicles circulating in Bucharest and in the metropolitan area, integrating surface transport with the underground one. The integration of the subway improves and completes the routes proposed by the application, which will be more efficient, with a shorter allotted time between the point of departure and the point of arrival. Within the application you can view on the map the complete route of a line or just a direction of the route and you can save your favorite routes. If a problem occurs with one of the routes, the application will send a notification to that effect. In the page dedicated to routes, you can view on the map in real time the vehicles on one direction of that route. You can select a station from the dedicated main page and you can see all the vehicles that stop at that station and what are the

waiting times for each. In addition, with the help of the application, you can pay for the trip.

In a study on attitudes and perceptions in urban mobility and public transport in Bucharest, conducted by the Research Institute for Quality of Life within the Romanian Academy, conducted in May 2018, on a sample of 1753 respondents. The average age of the respondents is 32 years old, with a university education in proportion of 90%, the owners of a car in proportion of 75%. In terms of travel in Bucharest, the most common vehicle is the subway, often used by 51%, followed by buses, trams and trolleybuses in 43%, personal cars in 24%, taxis and bicycles in 12% and scooters in the proportion of 2% [49].

Regarding the frequency of use, 28% of them use it daily, 31% use it between 5 and 6 days a week, and the rest use it less than 3 times a week. The average use of round-trip public transport is between 70 minutes and 80 minutes. The nearest station is located on average at 7 minutes, and 11 minutes is the average waiting period at the station.

In terms of conflict and violence in public transport, 88% had a feeling of insecurity in public transport, 96% witnessed verbal violence between passengers, 72% witnessed violence between drivers and passengers, 93% witnessed quarrels between ticketless passengers and controllers, 64% went without a ticket, and 57% were harassed in public transport or waiting stations.

Regarding the satisfaction with the accessibility and use of public transport, 41% of the respondents consider an accessibility of public transport, 32% use this type of transport in winter, 18% agree with the frequency of means of transport, and 5% consider an accessibility high for people with reduced mobility. At the level of satisfaction with the public transport facility, 70% agree with the tariffs, 21% are satisfied with the places available in public transport, 16% agree with the cleaning in vehicles, and 9% are satisfied with the air conditioning in public transport.

From the point of view of the strategy of improving public transport in terms of taxes, 76% are willing to pay more per ticket, 74% want to charge car access in the central area of the city, and 25% want to be free public transport for the inhabitants of Bucharest. Regarding the priority access and the special lanes, 92% consider that special lanes are introduced only for the surface public transport in the central areas, 77% want the means of transport to have priority on the small streets. And 86% want bicycles to have priority on small streets. In terms of waiting times and stations, 60% believe that the stations of means of transport should be more frequent, and 99% want the arrival time of vehicles to be announced.

In the study, the subject of civic behavior is also approached. Within it, 32% of the respondents addressed the district mayor's office to solve a problem, 26% made requests or complaints to public transport companies, and 66% participated in protests to solve community problems. The study also shows the availability of giving up the use of personal cars in favor of public transport, 93% would like this.

4.1.1. SWOT analysis

In order to better understand the conceptual and the purpose of the communication strategy at Societatea de Transport Bucuresti STB SA, an analysis of the clients' posts and comments was made, and the results are presented in the SWOT analysis. The most popular social networks are Facebook, with over 4,000 followers, Twitter with almost 2,000 followers, Instagram with about 100 followers and INFO TB application with over 100,000 downloads.

Table 2 shows the amount and type of data collected through these social networks and then analyzed to achieve the purpose of the paper. Data were collected with reference to three different exogenous scenarios, representative of the most common types of days: normal working days, public strikes and holidays.

Table 2. Data collected through Bucharest's urban mobility social media platforms

Nature	Source	N. of records
Post	Facebook	3
Comment	Facebook	146
Post	Instagram	0
Comment	Instagram	0
Post	Twitter	14
Comment	Twitter	0
Comment	App	0
Post	Official Web Page	3
Comment	Official Web Page	0
Tot.		Posts = 23 Comments = 146

To systematize this data, a SWOT analysis was performed.

The main *strengths* of public transport in Bucharest is represented by the dense network and with a high potential. Within the city there are over 150 routes, both in the city and in the metropolitan area. The rates for making the trips are low compared to other cities in Europe, there are many payment methods, including through the INFO TB application or by SMS. The fleet is partially modern, with hybrid buses, with low fuel consumption and buses from 2018.

In terms of *weaknesses*, the lack of single lanes for public transport, especially buses and trolleybuses, leads to substantial delays. Drivers of these vehicles often face the blocking of stations, because the city does not have enough parking spaces. The lack of an authority to manage surface and underground transport leads to the application of different policies to the two types of transport.

Among the main *opportunities*, the new urban projects for attracting new flows of passengers refer to attracting those people who travel with their own vehicles. In a new urban project, with single lanes dedicated to public transport, they could give up their own vehicle, for a much faster trip. In order to reduce the traffic in the city, park & ride systems can be arranged on the outskirts of the city, which should be correlated with the public transport terminals.

In terms of *threats*, the number of vehicles in the city is growing, leading to a congestion of traffic. The new residential neighborhoods that are being built on the outskirts of the city or in the metropolitan area do not provide for the integration of public transport, and this leads to overcrowding and various technical improvisations to integrate public transport.

Table 3. SWOT Analysis based on Urban Mobility Posts/Comments about Bucharest

Strengths	**Weaknesses**
- Dense network with high potential - Low rates compared to other neighboring countries - Public transport allows a variety of options - Partially modernized fleet	- Lack of lanes or single lanes for public transport - The lack of parking spaces leads to the blockade of public transport vehicles - Areas where several routes overlap over long distances - Lack of an authority to control both surface and underground transport
Opportunities	**Threats**
- New urban projects to attract new flows of travelers - Park & ride systems on the outskirts of the city related to public transport terminals - The fact that certain routes are crowded shows a high demand for public transport - Reviewing traffic programs for efficiency	- Number of vehicles growing in the city - Blocking other vehicle stations - Urban plans for new shopping centers or residential neighborhoods do not provide for the integration of public transport from the beginning and later there are various improvisations.

4.2. Case study Rome

The city of Rome has 4,342,212 citizens (2019) with the population density: 812/km2. According to Deloitte City Mobility Index 2020 about 60% of Romans use private transport, 20 % choose public transport, 18% of citizens travel by walking and 2% use bicycles for their everyday routine (https://www2.deloitte.com/content/dam/insights/us/articles/4331_Deloitte-City-Mobility-Index/Rome_GlobalCityMobility_WEB.pdf). This situation provokes one of the main problems for urban mobility system in Rome - high pollution due to a big number of private transport. Together with the old and undersized fleet it represents the main challenges for the Roman transportation system.

Rome has the Sustainable Urban Mobility Plan (PUMS) developed in 2019 by Roma Servizi per la Mobilità, a company at 100% owed by Roman authorities. The main objectives of the plan are stipulated as follows: to provide all citizens with transport options to access key destinations and services, improve safety conditions, reduce atmospheric and noise pollution, greenhouse gas emissions and energy consumption, increase the efficiency and economy of the transport of people and goods, contribute to the attractiveness of the area and the quality of the urban environment (https://www.pumsroma.it/ilpiano/obiettivi-del-piano/).

Rome's public transport company is ATAC S.p.A. According to ATAC official website it is the first urban mobility company in Italy and one of the largest local public transport companies in Europe.

ATAC manages all forms of public transport in the metropolitan area of Rome: surface and underground transport, railways and parking. ATAC network covers an area of approximately 2,200 square kilometers, ATAC infrastructure comprises 20 operational offices and depots, over 8,500 bus, tram and metro stops etc.

There are more than 11,000 employees in ATAC, the staff is divided at those who play a front-end role (drivers, train drivers, station operators, ticket office workers and inspectors) and those who work in the office, in the support area.

The main ATAC S.p.A. objectives are: customer orientation, service improvement, worker health and safety. One of the main challenges for ATAC nowadays is to make the city more sustainable and livable. In this regard it is important to provide the city with transport solutions and mobility infrastructures, as well as related services that together make urban mobility compatible with the quality of life standards, respect for the environment and individual and collective security.

The running ATAC initiatives reflect the main objectives of the company. The present projects have been developed with a view to the continuous improvement of urban mobility, through solutions that aim at innovation and environmental sustainability. One of such projects is +Ricicli +Viaggi (literally "the more you recycle – the more you travel") is aimed at the collection / recycling of PET plastic bottles through the machines present in subway stations. For each PET bottle the passenger receives an eco-bonus of 5 Euro cents that can be used to purchase travel tickets. Bike friendly initiative provides passengers with the possibility to take there folding and normal bikes to surface and underground transport thereby encouraging the use of bikes in the city.

In order to measure the quality perception of services provided by ATAC, the customer satisfaction survey is conducted annually (https://www.atac.roma.it/files/doc.asp?r=6685). Speaking about surface transport, based on the official data 34% of passengers was satisfied with the ATAC services in 2018, comparing to 34,6% in 2017 and 43,5% in 2016. The trend is opposite in underground transport – 52,8% of passengers was satisfied in 2018, comparing to 51,9 % and 50,3% in 2017 and 2016 respectively.

The analysis of the suggestions and proposals received in 2018 is also provided by the report. All in all 24.753 messages were received, 5,79% sent privately and 94,21% were expressed publicly. 85,56% of all messages were reports of different types, 12,91% were information requests, 1,18% for proposals and 0,34% for gratitude expression.

For online information on timetables and traffic routes on any changes or temporary interruptions of the service, events and projects of ATAC, several tools are used : the ATAC official website (www.atac.roma.it); the "travel with ATAC" App, profile in Whatsapp, the official social channels of ATAC S.p.A. in Facebook, Instagram, Twitter and YouTube.

4.2.1. SWOT Analysis

In order to understand the concept and purpose of social media strategy of ATAC S.p.A. an analysis of posts and customer comments was conducted. The results are presented in SWOT analysis. The most popular accounts among customers of ATAC S.p.A. are Twitter with 326 000 followers, Facebook with more than 40 000 followers and Instagram with 10 000 followers. ATAC S.p.A. actively uses these channels of communication but the very message and its frequency differs from channel to channel. Twitter is used for urgent notifications about changes in timetable, incidents, cancellations and the engagement of customers is quite low, most of the posts remain without comments, but at the same time the reaction of ATAC S.P.A. to the questions asked by customers is quicker and more frequent, Customers in twitter usually ask urgent questions about the state of the transport, do not express much their opinions, do not leave reports. In engagement of customers on Facebook is the highest of all ATAC S.p.A. social media platforms. On Facebook ATAC S.p.A. usually publishes announcements about upcoming events, ecological initiatives, implemented innovations. The post usually get from 30 to 200 comments and provoke discussion among followers without frequent comments from ATAC S.p.A. Instagram is not frequently used by ATAC S.p.A., posts get little comments and almost no discussion. All in all the customers express their opinions, proposals and complaints on ATAC S.p.A. social media platforms.

Table 4 shows the quantity and type of data collected through these social media, and then analysed to achieve the purpose of the paper. Also in this case, data have been collected with reference to three different exogenous scenarios, representative of the most frequent day types: normal working days, public strikes and festive days.

Table 4. Data collected through Rome's urban mobility social media platforms

Nature	Source	N. of records
Post	Facebook	4
Comment	Facebook	205
Post	Instagram	1
Comment	Instagram	14
Post	Twitter	95
Comment	Twitter	43
Comment	App	108
Post	Official Web Page	0
Comment	Official Web Page	0
Tot.		Posts = 100 Comments = 370

In order to systemize them, a SWOT analysis was conducted.

The main *strengths* of Roman public transport can be described in terms of continuous improvement. ATAC S.p.A. consistently takes measures to improve its services and infrastructure by introducing new fleet (with ecological hybrid vehicles) and opening new metro stations and itineraries of electric buses. ATAC

S.p.A. also promotes innovative sustainable ecological initiatives and the municipality of Rome supports several sharing platforms (both private and public), for cars, bike, moto and scooters, with several solutions based on full electric fleets. In order to promote and support these initiatives the Sustainable Urban Mobility Plan (PUMS) was developed in 2019. Also in Rome public transport rates are low if compared to the average of the European capital cities.

The *weaknesses* of Rome public mobility services can be divided in several categories. One of them is poor infrastructure, like dirty metro stations and old equipment that can lead to breakdown of facilities. Ecological problems are also a downside of Roman public transport – noisy vehicles and poor ecological state of the average public fleet that is one of the reason of air pollution in Rome. Undersized fleet together with uneven coverage and some inefficient public routes create major problems for citizens and visitors' mobility; another risk is currently related to COVID-19 pandemic – customers often complain about difficult social distancing and drivers and passengers who do not wear masks. Among other problems are unreasonable frequent strikes and unreliable and incomplete official mobile app.

In short, Ecological hazard and pandemic risks are the main *threats* for Roman public transport in the short run prospective. Implementation of new ecological norms can lead to a suspension of old fleet that do not meet new ecological requirements and hence can provoke a collapse in urban transportation system. Pandemic risks can cause limitations in public transport lines, more strikes and worsening of economic conditions.

The *opportunities* for Roman public transport consist in organization of comfortable infrastructure for passengers. It involves increase in the number and types of innovative sustainable ecological initiatives. Increase of the fleet will allow having a more widespread service, also improving the accuracy of the schedule and the perceived quality of the service. In times of COVID-19 pandemic it is particularly important because of the social distancing, which involves a strong reduction of seats in the vehicles. Another opportunity is the introduction of more efficient and sustainable public vehicles that can reduce the environmental impact, in terms of both air and acoustic pollution. Development of a brand new reliable and efficient mobile application, continuously updated about public transport schedules, routes, current position, possible problems, and offering a multitude of auxiliary services (ticket purchase, help centre chat, etc.) will have an impact on the citizen's quality of life and on the perceived image of the service. It is also important to deal with Covid-19 challenges providing more social distancing in public transport, taking measures to control wearing masks by passengers and drivers, to pay attention to visual information about pandemic response in transport and at the transportation facilities. The SWOT analysis described so far is presented in table 5.

Table 5. SWOT Analysis based on Urban Mobility Posts/Comments about Rome

Strengths	**Weaknesses**
- Innovative sustainable ecological initiatives (e.g. used plastic bottles for tickets machine; "ColoriAmoAtac") - New buses fleet - New lines of electric buses - Several car/bike/moto and scooter sharing platforms, also based on full electric solutions (public/private) - Low rates in comparison to the avareage of the Europaen capitals	- Poorly maintained and noisy fleet of public vehicles - Dirty metro stations - Limited number of public transports in comparison to citizens/city extension - The outskirts of the city are not always covered by public transport lines - Inefficient public transport routes - Difficult/impossible social distancing on public transports (risk connected to Covid-19 pandemic) - Dangerous drivers behaviours (bad driving, sometimes not wearing masks, etc.) - Long waiting times - Public transport schedule often not respected (mainly for buses) - Unreasonable frequent strikes - Unreliable and incomplete official mobile app in terms of time schedules, real-time updates, public transports routes and map representation, extra services offered
Opportunities	**Threats**
- Increase the number and types of innovative sustainable ecological initiatives - More efficient and sustainable public vehicles (fleet renewal) - Development of a brand new reliable and efficient mobile application, continuously updated about public transports schedules, routes, current position, possible problems, and offering a multitude of ancillary services (ticket purchase, help center chat, etc.) - More sharing solutions based on electric vehicles - More attention to social distancing due to the pandemic - More services and information provided to citizens and visitors in cleaner metro station	- Ecological hazard (ecological sustainability of the public fleet) - Prolongation of the pandemic in connection to limited public transport lines and possible strikes - Some lines or stations could be closed for the pandemic risks

5. Conclusion

In the last years, the rapid development of cities, along with the growth of urban population, has brought up many challenges for the organization of human urban mobility in the most sustainable and smart way. Effective urban mobility systems must be developed in accordance with the expansion of cities and their metropolitan areas. The high necessity for modern arrangements of citizens' movement leads to the need for searching alternative solutions to urban transportation systems alongside with inclusive and modern communication contact points. The main attention should be payed to environmentally friendly, accessible and cost-effective public transport. In this context, innovative solutions

have to be in line with citizens' demand of interactivity and with technological innovative solutions developed and widespread in the ICT market.

Indeed, public transport companies have to face new requirements. This article shows a comparison between the social media strategy of public transport management in Rome and Bucharest, based on the SWOT analysis built on the analysis of posts and comments published on social networks. Through these channels, citizens can express their wishes and dissatisfaction. The results show that in Bucharest, compared to Rome, public transport is not so developed in terms of social networks. One of the main differences between the two companies is that the transport company in Rome has all types of transport, including underground, while the company in Bucharest has only surface transport means.

Moreover, from the analyses carried out, it is possible to maintain that nowadays, citizens of large European cities are very active on social networks in terms of interactions concerning the possibility of improving services for the community.

A common result to both the cities considered is the lack of a systemic social media strategy, aimed at providing the citizens and visitors with updated and clear information available anytime and anywhere, alongside with a necessary improvement in the integration between new mobility solutions (e.g. electric mobility, bike, scooter and car sharing, mobility as a service tools etc.) and a renewed and sustainable fleet of conventional public transport services. Furthermore, the Covid-19 pandemic forces urban mobility systems to make efficiency improvements in order to minimize health risks.

As a main limitation, the present study refers to a limited number of social media posts/messages. Although the sample of data is not low in absolute terms (639 total records), in order to generalize the obtained evidence further research is needed to confirm the present results. A comparison with other European capital cities, using the same methodology and focusing on similar issues, would be also beneficial to the research in this field.

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