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THE ARRIVAL OF THE TRAMWAY IN ALGERIA: WHAT IMPACTS ON THE CITY? CASE STUDIES OF THE ORAN AND CONSTANTINE TRAMWAYS

Abstract: With the introduction of tramway systems in major cities, the Algerian government aims to promote the urban transport sector and foster opportunities for development within the urban fabric through the transitions and effects of tramway projects. Oran and Constantine, the capital cities of Western and Eastern Algeria respectively, are two regional metropolises that catalyze dynamic growth in their surrounding territories by providing employment opportunities and essential services.

The implementation of tramway lines in Oran and Constantine has led to several significant changes: an enhancement of the transportation network, a revitalization of neighborhoods traversed by the tramway, and shifts in mobility behaviors, particularly towards sustainability.

By adopting a comparative approach and referring to fieldwork, this article attempts to identify the effects of the tramways on the cities of Oran and Constantine. The objective is to identify the transitions induced by the arrival of this new infrastructure, including socio-ecological, urban, and economic impacts, as well as impacts on urban transportation.

Key words: tramways, tramways effect, transitions, urban transport, sustainable transport, Oran, Constantine

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INTRODUCTION

Traffic congestion, compounded by air and noise pollution, is a major challenge in large cities such as Oran and Constantine (Boussadi 2019; Rahal et al. 2018; Benazzouz et al. 2019). The negative impact of automobile traffic degrades the quality of life, making it essential to develop solutions. One such solution is the implementation of tramway systems, characterized by dedicated routes connecting different parts of the city, in line with sustainable development principles (Ribouh, Bensakhria 2011; Kahlouche 2019).

To address urban transportation challenges, the Algerian government has initiated policies to improve mobility through dedicated transport systems like the metro in Algiers and tramways in seven cities, including Algiers, Constantine, Oran, and others. These initiatives aim to balance urban transportation supply and demand, promoting sustainability (Kebiche 2017). The tramway lines in Oran May 2013 and Constantine July 2013 were part of this broader effort (Souiah 2017).

These urban transport projects, supported by the government and relevant ministries, aim to meet several objectives, including addressing travel demand due to demographic growth, enhancing peripheral-center connections, promoting modal shifts towards the tramway, and preserving the environment (Rebouha 2017). The tramway's role in urban regeneration and modernization is significant, acting as a catalyst for urban development (Richer 2018; González et al. 2013; Wolff 2012).

Although studies have highlighted the tramway's impact on urban modernization, its effects span economic, social, environmental, and functional domains. For instance, the Constantine tramway project has been recognized as an ecological solution, reducing air pollution (Ribouh, Bensakhria 2011). This article explores the impacts of tramways in Oran and Constantine from multiple perspectives, posing the question: What are the effects of tramway implementation in these cities?

CONCEPTUAL FRAMEWORK

By introducing the conceptual framework employed in this study, we aim to elucidate the fundamental concepts underpinning our research and the interactions among these notions.

The Tramway Effect on the City

The tramway functions as more than just a transportation mode; it acts as a development catalyst within cities (González et al. 2013; Gouin 2007). This "tramway effect" combines infrastructure with features like real-time information, station comfort, service frequency, and public space requalification (Beaucire 2006). Beyond solving urban transport issues, tramway projects provide an opportunity for sustainable urban development across planning, socio-economic, environmental, and mobility sectors (Kebiche 2017).

Tramway implementation often stems from a desire to enhance mobility and drive urban renewal, leading to a transformation of the city's image (Redondo 2015). This process includes improving transportation services, creating new urban landscapes, revitalizing neighborhoods, and reconfiguring public spaces, which all positively impact public space use and residents' quality of life (Gouin 2007).

Socially and economically, tramways connect neighborhoods, promote diversity, and enhance access to employment (Mezoued 2016). Urban development is influenced by new urban images and re-developed neighborhoods along tramway corridors (Lieu du Design and IAU 2014). Environmentally, tramways establish clean transportation, reduce pollution, decrease car dependence (Rocci 2007), and maintain environmental quality (Mezoued 2016). Tramways thus serve as city models, not just transport solutions (Hamman 2013a).

However, while tramway impacts are significant, their effects are neither automatic nor easily replicable (Kebiche, Chanson-Jabeur 2015).

The Tramway as a Lever for Change and Urban Development Tool

Public spaces in urban areas serve as both thoroughfares and social interaction hubs, with their use shaped by transportation modes. The tramway drives public space rehabilitation, focusing on reallocating space for collective transport, reclaiming areas for active transport, and enhancing architectural and urban heritage, thereby boosting the city's metropolitan prominence (Laisney 2001; Maitre 2016). Public spaces foster a sense of collective belonging, with the tramway playing a key role in shaping city identity (Stein 2003).

Ecologically, tramways reduce air pollution by using electricity, which lowers greenhouse gas emissions in line with Kyoto Protocol goals, and cuts pollution-related illnesses (Allemand, Bouillin 1985). A tramway can replace 3 buses or 150 cars, significantly reducing noise, pollution, and energy consumption (Ribouh, Bensakhria 2011).

At the urban scale, tramways lead to transformations through new urban furniture (traffic lights, lighting, signage) and passenger infrastructure (bus stations, park-and-ride facilities) (Diabi, Lazri 2022). Socially, they integrate modern public transportation usage and sociability. Philippe Hamman's work highlights how tramways reshape spatial, social, and institutional urban organization, with comparative examples from cities like Strasbourg, Montpellier, and Grenoble. According to this book, the tramway contributes to transforming the spatial, social, and institutional organization of cities (Hamman 2013b).

Modal Shift in Favor of Public Transportation

Modal shift refers to the transfer of passenger or freight traffic from one mode of transportation to a more environmentally friendly one, aiming to reduce car use and promote alternatives like public transportation (Vincent 2008; Conti 2016; Kaufmann 1997). Specialists now view the modal shift as involving multimodality or intermodality (Nguyen 2011). Multimodality refers to using diverse transportation modes for a journey (I'Hostis, Conesa 2010), while intermodality involves combining multiple modes in a single trip, like transit and transfers (Richer, Vuidel 2011).

Transportation policy encourages moving away from all-car models to softer modes like biking and walking, or collective modes like rail and buses. Multimodality and intermodality can involve partial or complete shifts toward public transportation and non-motorized modes, particularly in rail/road and rail/soft mode coordination (Nguyen 2011). Environmentally, alternative transport chains are favored over road transport, guiding policies toward a multimodal approach.

PRESENTATION OF THE CASE STUDIES: THE TWO METROPOLISES OF ORAN AND CONSTANTINE

The Oran Metropolis

Oran, Algeria's second-largest city and a key metropolis in the northwest, lies 432 km from Algiers and 803 km from Constantine. Founded in 902 by Andalusians, Oran has a rich history, including periods under various Arab-Berber dynasties, Spanish occupation, and French colonization. The city rapidly developed into Algeria's second-largest urban center. By 2019, Oran had 645 984 residents within the municipality and 1 577 556 in the wilaya¹. The metropolitan area, encompassing Oran, Es-

¹ "Wilaya" is an administrative division used in several North African countries, including Algeria, where it is similar to a province or district. Each wilaya is headed by a Wali, an official appointed by the central government. In Algeria, there are 58 wilayas, each with its own capital city.

Senia, Bir El Djir, and Sidi Chahmi, had a population of 817 612 and serves as a major administrative, educational, economic, cultural, and touristic hub, driving significant daily movement.

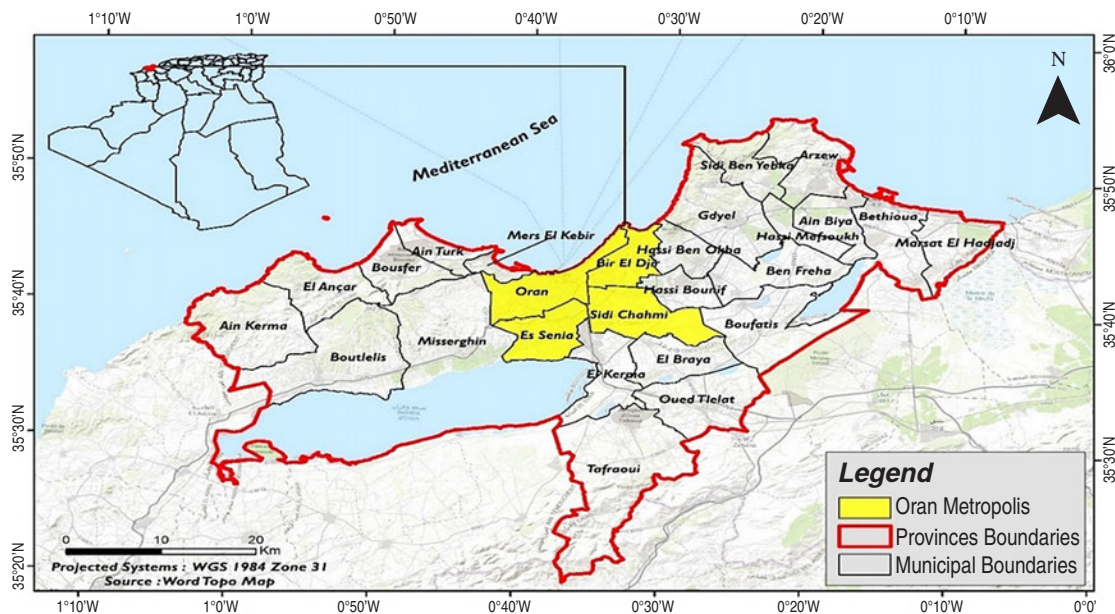


Fig. 1. Geographic location of the city of Oran
Source: own elaboration on the basis of OSMF, 2021.

The Oran Tramway

The Oran tramway, inaugurated in May 2013, is one of the city's most ambitious projects. The 18.7 km line connects Es-Senia University in the south to the Sidi Maarouf bus station in the north-east, with 32 stations and 4 exchange hubs (Fig. 2). The maintenance center is located near the Es-Senia University terminus. Designed to link Oran's southern and eastern suburbs, including two major university campuses, the tramway also serves the city center. According to EMA (Algiers Metro Company), it has improved traffic flow and contributed to the city's vitality and revitalization.

The Metropolis of Constantine

Constantine, Algeria's third-largest metropolis, is located in the northeast, 430 km from Algiers and 803 km from Oran. In 2019, the Constantine metropolitan area, consisting of five municipalities (Fig. 3), had 1 291 575 residents, with over 740 000 in Constantine and Ali Mendjeli. Historically the capital of eastern Algeria due to its strategic location, Constantine remains the central hub, while other municipalities contribute to the region's economy, administration, heritage, and tourism. The city's activities drive significant daily movement, supported by various transportation options, including buses, taxis, tramways, and cable cars.

The Constantine Tramway

The Constantine tramway began operations in July 2013, covering 8.1 km from the city center (Ben Abdelmalek Ramdan Station) to Zouaghi Slimane, with 10 stations and 2 exchange hubs. In June 2019, a 7 km extension with 5 stations connected Zouaghi Slimane to the new city Ali Mendjeli via Kadri Brahim Station. The second extension, launched in September 2021, added 3.49 km and 6 stations,

reaching Abdelhamid Mehri University. The Constantine tramway spans 18.5 km with 21 stations, linking the old city to Ali Mendjeli (Fig. 4).



Fig. 2. Tramway lane in the city of Oran
Source: own elaboration on the basis of OSMF, 2021.

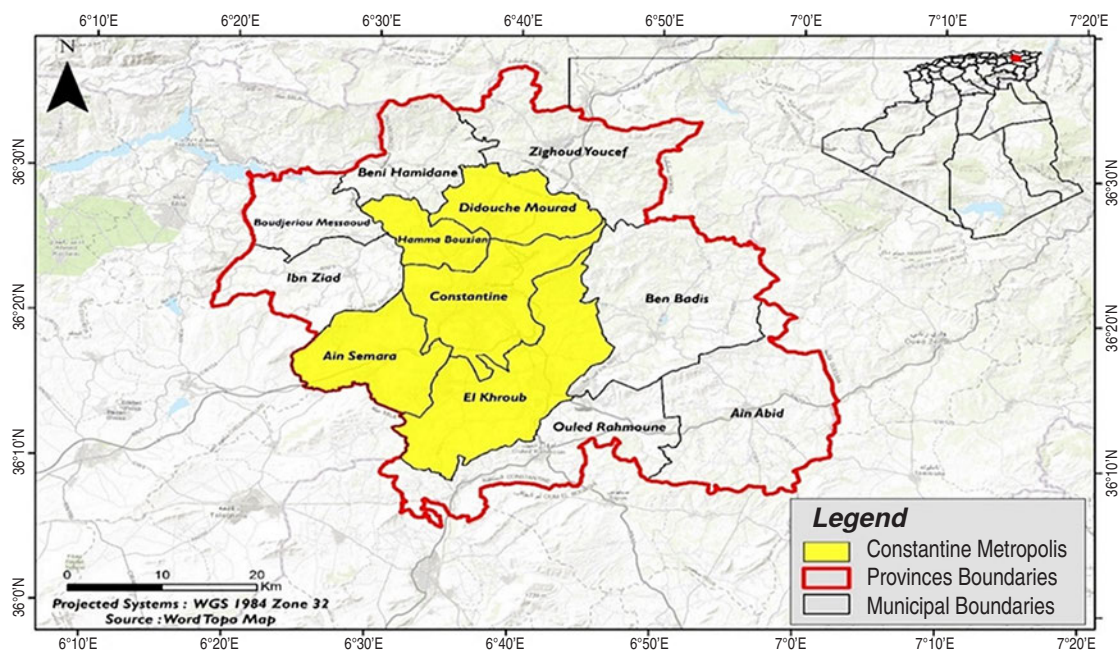


Fig. 3. Geographic location of the city of Constantine
Source: own elaboration on the basis of OSMF, 2021.

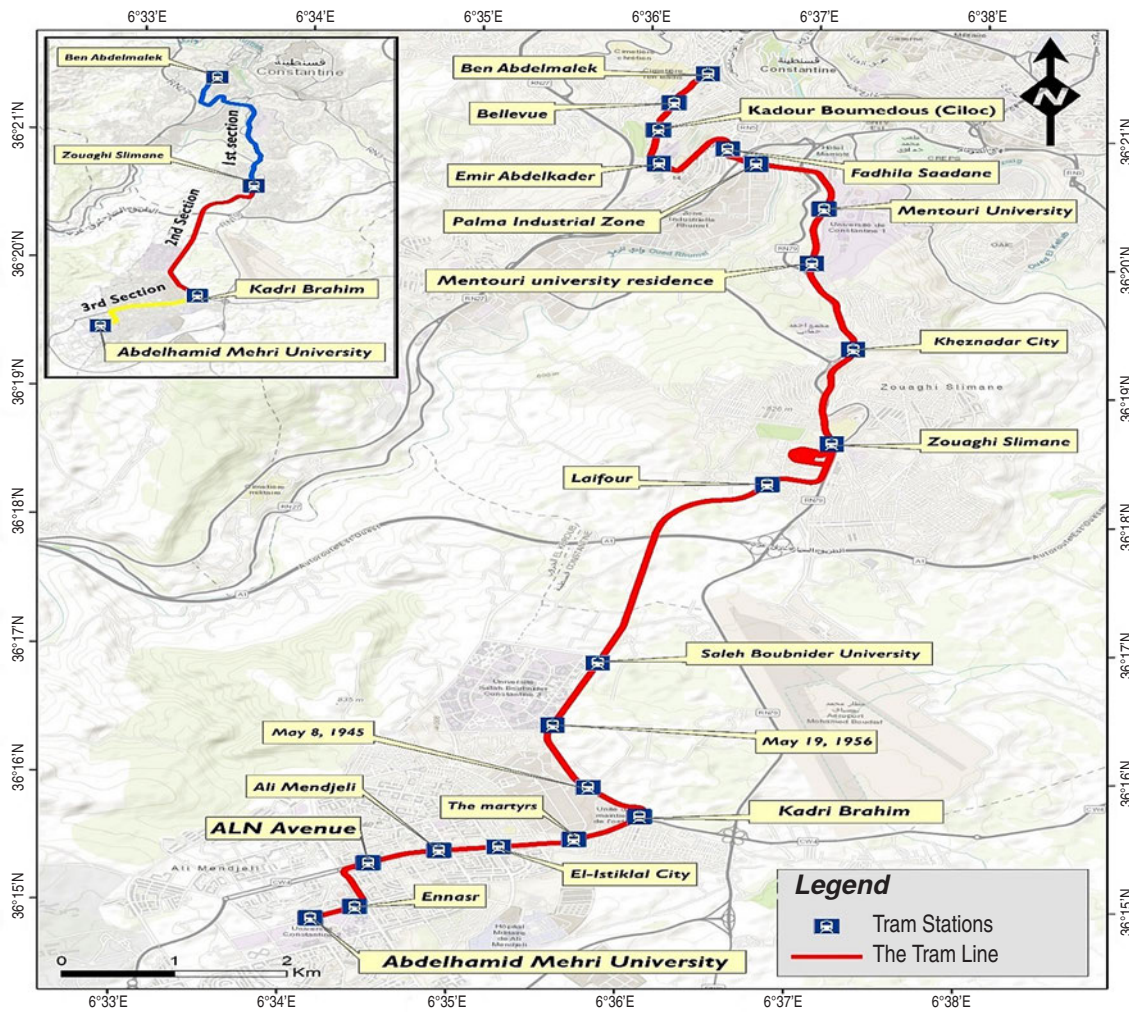


Fig. 4. Tramway lane in the city of Constantine
Source: own elaboration on the basis of OSMF, 2021.

METHODOLOGY

This study aims to analyze the impacts and transitions resulting from the tramway projects in Oran and Constantine. We use a combination of qualitative and quantitative methods, including surveys, interviews, and data analysis, and engage with stakeholders and experts for comprehensive insights.

Data collection began in 2019 as part of a doctoral thesis and continued through 2020–2021. We conducted interviews with stakeholders, officials, and administrative personnel from relevant services. Additionally, a short-term internship at SETRAM in Oran provided valuable data on the tramway system in both cities.

Due to limited data on tramway impacts, we designed a questionnaire targeting over 1,000 tram users in both cities. After testing on 100 passengers, the full survey was conducted in Constantine in 2021, followed by Oran. Data was processed using SPSS and analyzed for insights. The questionnaire covered three areas: general participant information, tramway usage, and tramway effects across environmental, social, functional, temporal, and spatial dimensions.

We conducted 25 directed and semi-directed interviews with transportation sector leaders (EMA, SETRAM, BETUR), elected officials, residents, and local merchants to assess the tramway's impact on urban fabric and commerce. Field visits allowed participatory observation along the tramway line, helping us validate our hypotheses with real-world experiences and capture details not covered in interviews (Riandey et al. 2000).

RESULTS AND DISCUSSION

Through a comparative approach and cross-analysis of fieldwork results on the tramway systems in Oran and Constantine, we identified the following effects.

Effect on the Urban System

The tramway project significantly impacts the physical and aesthetic characteristics of cities, leading to changes in road configurations, traffic patterns, public spaces, and building facades.

Effect on Public Roads and Mobility

The tramway's use of street space in Oran and Constantine affects vehicular and pedestrian traffic, requiring roadway design adaptations. In Oran, 50% of surveyed passengers noticed an impact on road dimensions, with 95% attributing it to road narrowing, confirmed by field observations. Notable changes include:

- Conversion of certain Oran roads into pedestrian and tramway-only zones.
- Redirection of one-way traffic to allocate space for the tramway.
- Retention of regular traffic flow alongside axial or lateral tramway tracks.

In downtown Oran, streets like Emir Abdelkader and Mostaganem have been transformed into zones dedicated to the tramway, with narrow sidewalks as small as 70 cm for pedestrians. These changes have affected adjacent streets and neighborhoods due to lane closures for cars, forcing some motorists to drive on tram tracks. Hammou Mokhtar Street serves as an example of a road converted to one-way traffic, where one lane is allocated to the tramway, reducing road capacity and parking spaces. This leads to motorists parking on sidewalks, obstructing pedestrian traffic, and creating safety risks for tram users and pedestrians. Additionally, motorists using tram tracks to bypass congestion endanger both trams and pedestrians, negatively impacting nearby shops due to parking difficulties (Photo 1).



Photo 1. Parking on the sides and the use of the tramway track by motorists

Source: Photo by Author, June 2021.

In Oran's suburban areas, the tramway has had minimal impact on road width, as roads retain two lanes, with the tramway track either adjacent or in the median. The project has spurred external enhancements, such as green spaces near the tracks in neighborhoods like Essabah and USTO, enriching the urban landscape. One resident noted that the tramway revived the city's historical charm, blending modernity and comfort while improving mobility and reducing congestion.

In Constantine, the tramway did not extend into the downtown core due to the historic El-Koudia prison, leading to the termination of the line at Ben Abdelmalek Station, near the prison wall (Photo 2). Unlike Oran, Constantine saw less street transformation, with traffic mainly redirected in one direction, such as in the Belle-Vue neighborhood.

In Constantine, 41% of passengers believe the tramway altered road dimensions, especially between Fadila Saâdane Station and Ben Abdelmalek Ramadan terminus, where traffic is restricted to one lane in both directions. Concerns also arose about the narrowness of the road in the Ciloc neighborhood, leading to frequent traffic issues, particularly during vehicle breakdowns or emergencies (Photo 3).



Photo 2. Tramway line stops in front of the historic El-Koudia prison wall
Source: Photo by Author, July 2024.



Photo 3. The tramway route in the Ciloc neighborhood
Source: Photo by Author, July 2024.

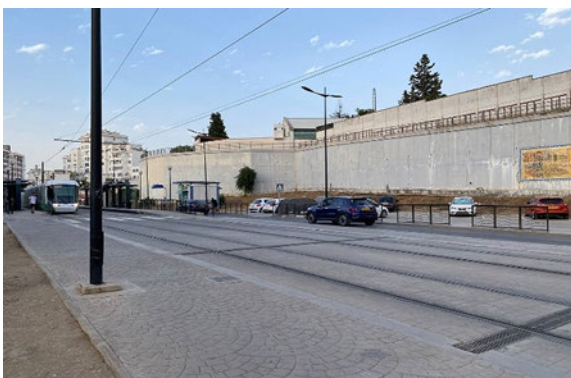


Photo 4. Traffic in one direction in the Belle-Vue neighborhood
Source: Photo by Author, July 2024.



Outside Constantine's city center, from Fadila Saâdane Station to Ali Mendjeli, the tramway has not impacted road dimensions, maintaining two-way traffic either on the side or in the middle of divided roads. The tramway projects in Oran and Constantine have also led to urban infrastructure im-

provements to enhance traffic flow and reduce congestion. In Constantine, a key project is the 427-meter tramway bridge connecting the Palma industrial zone to Mentouri University. In Oran, significant projects include a bridge over the highway between Essabah and Sidi Maarouf stations and placing the Castors station 6 meters below road level to preserve traffic flow.

The Effect on Public Spaces

The introduction of the tramway in Oran and Constantine has significantly contributed to the rehabilitation of public spaces. In Oran, the tramway line runs through the city center, including November 1st Square, a historic landmark. The route preserved the square's trees and updated the urban furniture and lighting, creating a modern atmosphere. In Constantine, although the tramway does not cross the main public squares, it has led to the creation of small public spaces in the city center (Photo 5), a fact confirmed through field interviews with BETUR, who affirmed the tramway's significant role in creating these spaces. Additionally, 75% of the 1000 surveyed individuals in both cities believe the tramway has improved the cities' aesthetics and modern image.

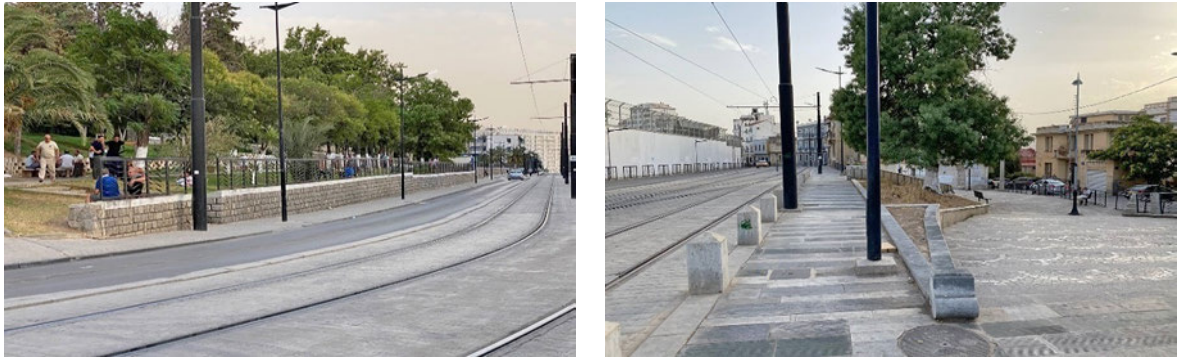


Photo 5. The creation of small public squares in Constantine city center
Source: Photo by Author, July 2024.

Impact on Buildings and Facades

In Constantine, 67% of respondents believe the tramway has improved urban facades, particularly in the city center, aligning with broader initiatives like the Modernization Project of the Metropolis of Constantine (PMMC). Notably, the tramway route avoided building demolitions, demonstrating successful urban integration. In contrast, Oran's tramway raised concerns about negative impacts on urban structures, including vibrations affecting historical buildings and safety risks at tram stations. However, 50.8% of Oran's passengers recognize the tramway's positive impact on facades outside the city center, supporting modernization goals. These experiences highlight the need for comprehensive urban planning, stakeholder engagement, and adaptive management to ensure tramway projects balance benefits with potential disruptions.

Impact on the Social System

The tramway systems in Oran and Constantine significantly enhance urban social life by improving accessibility, safety, affordability, social inclusion, and equity, thereby fostering more cohesive communities and promoting sustainable mobility.

The tramway notably improves accessibility, particularly for individuals with reduced mobility, through dedicated spaces and easily accessible stations, while also promoting multimodality and reducing reliance on private cars. Survey results indicate that 66.3% of respondents rate accessibility as good, 28.7% as medium, and only 5% as difficult.

Safety is another key factor in the tramway's success, with features like moderate speeds, surveillance cameras, pedestrian-friendly infrastructure, and onboard security personnel contributing to 98% of passengers feeling safer than with other travel methods. Affordability also plays a crucial role, making the tramway accessible to a broad demographic, with 80% of respondents finding ticket prices reasonable.

The tramway reduces social exclusion by connecting underserved neighborhoods, fostering community integration, and achieving a 97.7% approval rate for meeting residents' diverse needs. Additionally, the system promotes equity by offering affordable and accessible transport across socio-economic groups, helping bridge social disparities and contributing to a fairer urban environment.

Impact on the Environment

The tramway is an eco-friendly transportation mode, as confirmed by EMA (Algiers Metro Company) officials in Oran and Constantine, due to its electric operation and lack of CO₂ emissions. The most notable changes include:

Tree Planting and Green Space Development

The tramway project has contributed to creating green spaces and planting trees to enhance the environment and visual appeal of the corridor, with varying impacts between the two cities. In Constantine, 34% of passengers noted the establishment of green spaces and tree planting as the most significant environmental transformation, especially from Emir Abdelkader Station to Ali Mendjeli.

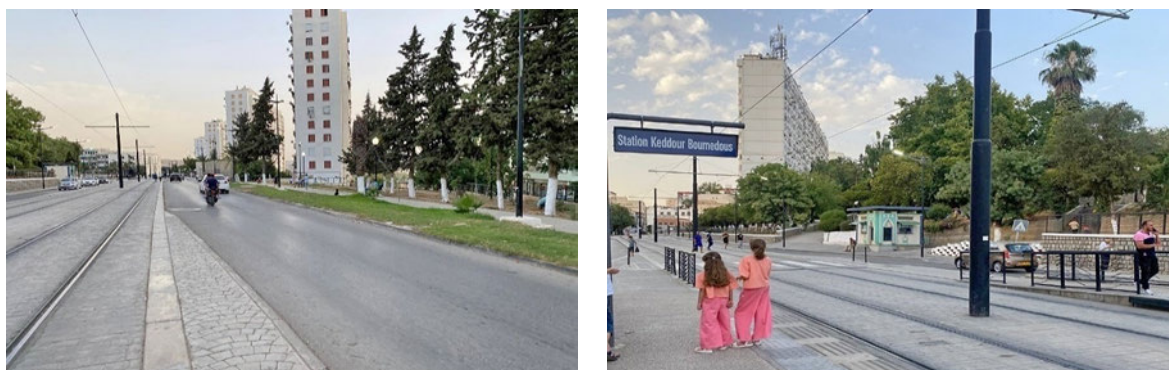


Photo 6. The creation of green spaces and the planting of trees in Constantine

Source: Photo by Author, July 2024.

In Oran, green spaces are largely absent, especially in the old town, despite efforts to preserve some existing trees. A 65-year-old resident from Mostaganem Street remarked that the tramway project has turned Oran's city center into a "concrete jungle" with far fewer trees than before (Photo 7). According to BETUR (Urban Transportation Studies Bureau) responsible for the Oran tramway project, the lack of green spaces along the tram route is due to limited space in the city center, where only the tram tracks could be accommodated. However, they emphasized that efforts were made to add greenery in areas with more space, as observed during field visits.

Noise Reduction

The tramway has successfully reduced noise along its corridor by decreasing road traffic. In Constantine and Oran, 80% of users confirm that the tramway produces little noise, providing tranquility for users and residents. A Belle Vue resident in Constantine remarked, "I live near the tramway, with tracks passing in front of my balcony, but I rarely hear it at night." This noise reduction is due to re-allocating road space previously dominated by cars, especially in historic neighborhoods, which has eased vehicular congestion and reduced noise pollution, addressing key urban challenges.



Photo 7. Lack of green spaces and trees in some streets of the city center

Source: Photo by Author, December 2022.

Air Pollution Reduction

The electric tramway produces no harmful emissions, such as CO₂, and encourages alternative transportation to private cars, reducing air pollution. According to Constantine's Transportation Department, air pollution decreased after the tramway's implementation in 2018. Before the tramway, 92.75% of air pollution was caused by private cars, with buses and minibusses accounting for 7.25%. The tramway helped reduce air pollution by 47% for buses, 27% for minibusses, and 26% for cars (Table 1).

Table 1. Reduction Rates of Public Transport Modes Pollution after the Implementation of the Constantine Tramway

Vehicles	Fleet in service by rotation	Equivalence of 1 tram in other vehicles	N. tram trains	Level (%) of pollution before the tram	Reduction (%) of pollution after the tramway
Bus	121	3 Bus	40	3,36	47,06
Mini bus	140	6 minibus	23	3,89	27,06
Collective taxis	3342	150 taxis collectifs	22	92,75	25,88

Source: Transportation Department of the Constantine Province, 2018.

As for Oran, there is insufficient data available regarding the tramway's impact on reducing the city's pollution.

The Tram Effect on the Urban Transport Offer

The tramway in Oran and Constantine enhances the urban transport system by offering an efficient alternative for many residents to navigate the city.

Improvement of the Urban Transport System

The tramways in Oran and Constantine have significantly improved urban transport, serving over 35,000 passengers daily in Oran and 27,000 in Constantine. Peak hourly ridership reaches 4,600 in Constantine and 5,000 in Oran. According to SETRAM, the entity responsible for operating the tramways in both cities, the tramways transported over 12.8 million passengers in Oran and 9.9 million in Constantine in 2019 (Table 2).

The tramways in Oran and Constantine are seen as efficient transportation modes, with over 94% of field survey participants stating that the tramways ease their commutes. The tram's ap-

Table 2. Number of passengers transported by the Oran and Constantine tramway

System	Tramways					
	Oran			Constantine		
	Avg/Day	Avg/Month	Year	Avg/Day	Avg/Month	Year
passengers	35 813	1 074 387	12 892 635	27 739	832 158	9 985 896

Source: EMA operating results, 2019.

peal varies by user, but its reliability, shorter travel times due to dedicated lanes, and reasonable cost make it a preferred option. About 81% of respondents in both cities find the travel cost fare, particularly for longer journeys, though some users consider the cost high for short trips.

Encouraging Intermodal Practices

The tramways in Oran and Constantine have encouraged intermodal transportation and reduced reliance on private vehicles. In Oran, four interchange stations, and in Constantine, three, facilitate easy transitions between the tram and other transport modes. In Constantine, 45% of respondents use another mode of transport with the tram, while in Oran, 41% do the same. However, using designated parking for tramway users remains relatively low, not exceeding 42% in either city. The tramways connect with inter-wilaya transport lines, urban bus stations, and other public transport, improving accessibility and ease of movement for residents in both cities (Table 3).

Table 3. Types of Intermodal Infrastructure in Service

Type	City	Location	Area (m ²)	Number of UT lines	Interconnection with the tram in meters (m)
Bus station	Oran	Essabah	22000	24 lines 14 inter-wilaya, 5 urban, 5 suburbans	Next to the tram line (500 m)
	Constantine	Ali MENDJELI	23000	34 lines 26 inter-wilaya, 8 urban	Next to the tram line (50 m)
Train station	Oran	Central train station in Plateau	35000	70 lines 10 main lines, 52 regional and 8 suburbans	Next to the tram line (200 m)
Exchange centers	Constantine	Palma industrial zone exchange hub	21000	21 inter-wilaya	Crossed by the tram line
Taxi Stand	Oran	Cité Djamal Eddine	12000	8 inter-wilaya	Next to the tram line (500 m)
		USTO	18000	24 inter-wilaya	Next to the tram line (200 m)
BUS stops	Oran	18 Tram Stations	/	16 urban lines	Next to the tram line (de 20 a 100 m)
	Constantine	14 Tram Stations	/	12 urban lines	Next to the tram line (de 20 a 100 m)

Source: Data from the Transportation Department of the Constantine Province and the Transportation Department of the Oran Province, 2018.

Improvement in Accessibility

Oran and Constantine face heavy downtown traffic, especially during peak hours, making commuting difficult. The tramway has improved urban mobility by offering a regular, fast alternative to reach key destinations, including shopping centers, universities, administrative centers, and downtown areas. Strategic routing covers the city's main mobility hubs, enhancing accessibility. In Constantine, 74% of passengers find tram travel time shorter than other modes, while in Oran, 77% agree. Field observations confirm that the tram is faster than buses, particularly during peak hours when congestion slows bus travel.

The Economic Impact of the Tramway

The tramway systems in Oran and Constantine have significantly impacted the local economy, creating both direct and indirect jobs. SETRAM reports over 600 employees in Oran and more than 500 in Constantine, with additional jobs in tramway maintenance and related sectors. However, precise data on these impacts is challenging to obtain.

Our study shows mixed effects on commerce. In Oran, streets like Mostaganem and Mascara experienced negative impacts due to traffic disruptions, leading to shop closures or relocations. Similarly, in Constantine, the Ciloc neighborhood saw reduced business activity because of blocked access.

On the other hand, the tramways spurred economic growth in areas near stations, creating new commercial zones, as seen in Djamel Eddine in Oran and 400 Housing in Constantine.

Localization of Transitions Resulting from the Tramway Project in the Two Studied Cities

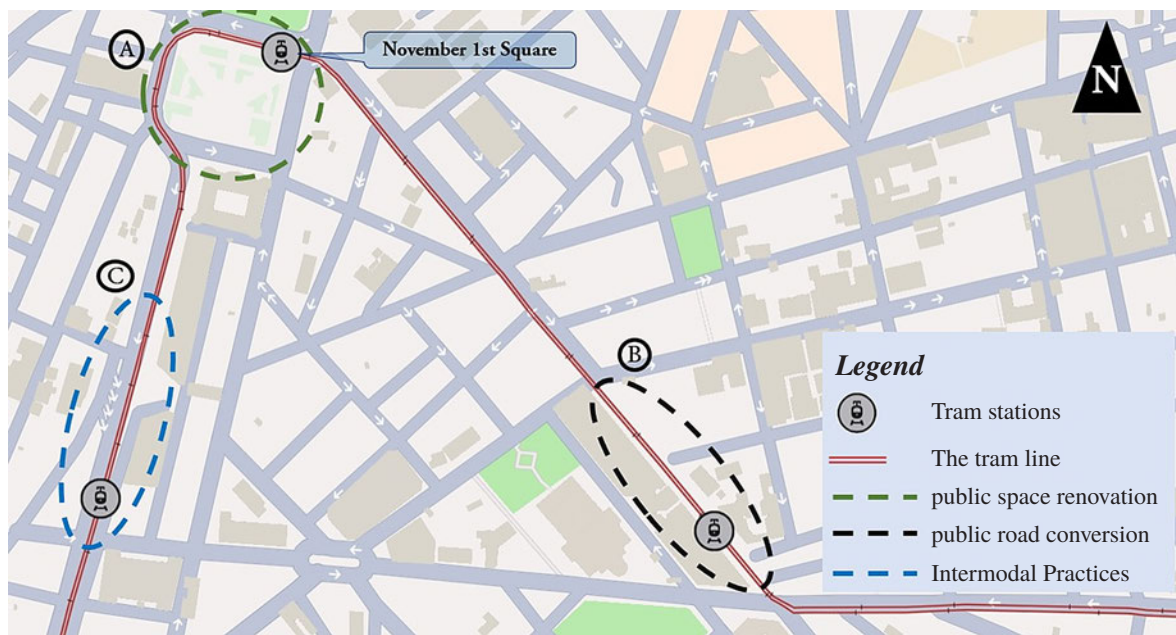
Our fieldwork, surveys, and data from authorities in Oran and Constantine reveal that the tramway system has significantly transformed the urban fabric in both cities. While there were some negative effects, the overall impact has been predominantly positive due to the high level of service provided. The most significant impacts occur along the tramway line and within a 500-meter corridor on each side (Mezoued 2015). These impacts are represented in:

The Tramway Impact at the Dedicated Lane Level

Our case studies reveal that the efficiency and appeal of Dedicated Lane Public Transport stem from the integration of the tramway with its own site. The tramway in Oran and Constantine offers numerous benefits: it enhances urban transport options by providing a modern, efficient alternative to cars, promoting sustainable development, and strengthening the city's identity with a dynamic public transport system. Public space requalification through tramway implementation fosters active transportation modes by creating a safe, accessible urban environment. Street redesign and improved urban facades along the tramway route contribute to a more attractive cityscape, boosting the local economy, except in areas less receptive to these changes.

Tramway routes have also transformed some streets into pedestrian spaces, reducing car traffic and emissions while enhancing pedestrian environments. Safety has improved, especially for pedestrians, with clearly defined spaces and reduced car traffic. Noise levels have decreased due to quieter tram cars and limited vehicle traffic, improving the soundscape and residents' quality of life. Accessibility for people with reduced mobility has been a priority, with dedicated spaces for easier boarding and alighting.

However, challenges remain. Street closures, such as Mostaganem Street in Oran and Ciloc in Constantine, have limited traffic flow and impacted commercial activity due to the lack of nearby parking facilities. Reduced parking has led to hazardous situations, as motorists park on sidewalks or in tramway lanes, disrupting traffic flow.



(A) November 1st Square before and after the introduction of the tramway in Oran city

Source: www.flickr.com/photos/28751113@N02/4643193362/ / EMA Website.



(B) Allocating the street to the tram route only

Source: SETRAM Website.



(C) Intermodal practices station Tram / BUS

Source: www.algeriemesracines.com

Fig. 5. Example of the tramway impact at the dedicated lane level in Oran city center

Source: own elaboration on the basis of Mapbox, 2024.

The Tramway Impact on the Corridor

The tramway's implementation in Oran and Constantine has significantly impacted the corridor within a 500-meter radius of its route. It promotes multimodality by establishing interchange points, improving access to nearby neighborhoods, and enhancing mobility. As an attractive transportation option, the tramway stimulates the development of new commercial activities and points of interest, enriching services and entertainment options. It also facilitates access to key locations like universities and government offices.

New commercial and attraction zones have emerged, creating employment opportunities. Green spaces and public spaces near the tramway have been renovated, enhancing connectivity with surrounding neighborhoods. Modernization efforts include the installation of urban furniture, improved signage, and public lighting, increasing safety and attractiveness.

Parking zones near the tramway tracks, particularly in Constantine, have been established to encourage tramway use, reducing traffic congestion, pollution, and noise. The tramway fosters dynamic commercial movement and reinforces social integration by providing a modern, accessible mode of transport. It enhances connectivity between neighborhoods, promotes sustainable mobility, and improves access for low-income individuals to employment, leisure, and essential services. Ultimately, the tramway links peripheral neighborhoods to city centers, preserving the identity and function of both areas.

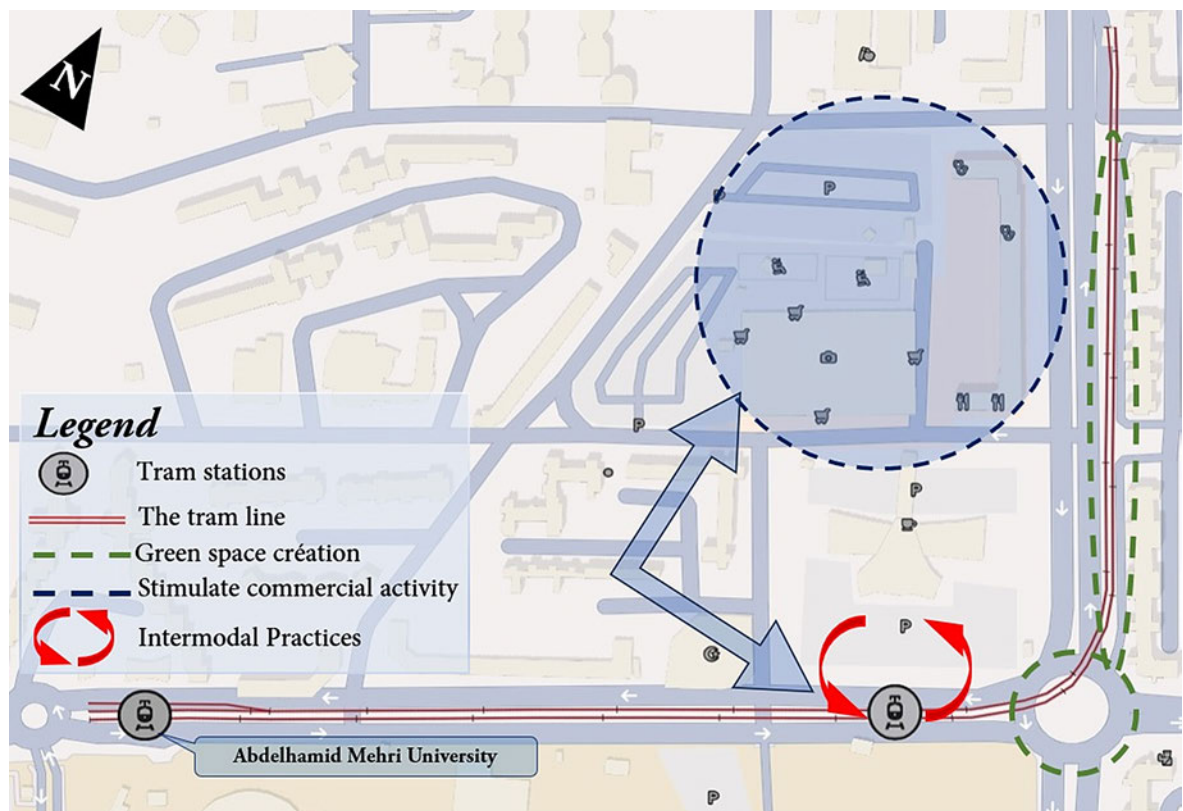


Fig. 6. Example of the tramway impact on the corridor in Constantine City

Source: own elaboration on the basis of Mapbox, 2024.

Final Insights on the Tramway Impact between Oran and Constantine

Our analytical study identified the key effects of the tramway on both cities. The following table provides a comparative overview of these impacts between the two metropolises.

Table 4. Tramway Effect between the Cities of Oran and Constantine

		Oran	Constantine
Effect on the urban system	Public roads and mobility	– Permanent closure of certain roads in the city center. – Traffic redirection to one-way flow – Reduction of sidewalk dimensions.	– Redirecting traffic to one direction at Belle Vue. – Preserving the dimensions of most roads traversed by the tramway track.
	Public spaces	Renewal of Place of 1st November in downtown.	Creation of small public squares next to the tram line.
	Building and facade	– Improvement of urban facades along the tramway route. – Some collapses and cracks in certain old buildings in the downtown area.	– Improvement of urban facades along the tramway route. – Renovation of the stands at Ben Abdelmalek Ramadan Stadium to facilitate the passage of the tramway line.
Effect on the urban transport system	The transport offer	Improvement of the transportation service as the tramway carries more than 35,000 passengers per day.	Improvement of the transportation service as the tramway carries more than 27,000 passengers per day.
	Intermodal practice	– 04 interchange stations. – Several bus stops located near tramway stations. – Interconnection of the tramway with the railway station.	– 03 interchange stations. – Several bus stops located near tramway stations.
	Accessibility improvement	– Facilitating travel to attractive areas. – The location of tramway stations and their specific layout, taking into account all segments of society, including persons with reduced mobility, make tramway usage easier and more accessible.	
Effect on the environment system	Noise reduction	The introduction of the tramway system in both cities has contributed to reducing the use of other modes of transportation, resulting in a decrease in noise along the route.	
	Reduction of air pollution	– The use of the tramway relies on a clean, non-polluting electric power source.	– The use of the tram is based on a clean, non-polluting source of electrical energy. – Reducing air pollution caused by transportation modes as follows: 47% for buses, 27% for minibuses and 26% for collective taxis.
	Creation of green spaces	The inability to create green spaces, especially in the city center, due to lack of space, except for the development of a few existing spaces.	Creation of green spaces and planting of trees.
Effect on the social system	Social inclusion and security	– Providing security and comfort facilities. – Designing sidewalks and stations to ensure the safety of tramway users. – Facilitating accessibility to all tramway stations, considering all segments of society, including persons with reduced mobility.	
Effect on the Economic system	Jobs	– Generating both direct and indirect employment. – Over 600 employees at SETRAM.	– generating both direct and indirect employment. – More than 500 employees at SETRAM.
	Commerce	– Closure or Conversion of Some Commercial Stores in Some Streets in the City Center. – Creation of Commercial Areas in Some Regions Due to the Dynamic Movement of the Tram.	– the Ciloc neighborhood experienced reduced business activity because of blocked access. – Creation of Commercial Areas in Some Regions Due to the Dynamic Movement of the Tram.

Source: authors' elaboration.

CONCLUSIONS

The tramway projects in Oran and Constantine are integral to the Algerian government's transportation development strategy, reinforcing the cities' roles as major regional capitals. These projects address growing mobility demands while promoting economic, social, and environmental sustainability. The government's initiative to introduce modern public transportation systems reflects an understanding of the need to integrate ecological considerations into urban development.

The tramway has positively impacted the urban fabric of both cities, particularly along the line and corridor. Environmentally, it provides a sustainable solution by reducing pollution, as trams run on electricity and avoid harmful emissions. Green spaces and tree plantations along the line further enhance environmental benefits. Socially, the tramway promotes integration by offering accessible transportation for all social categories, particularly those without cars. The requalification of urban areas along the tram lines strengthens social cohesion.

The tramway has quickly become a vital part of the transportation network in Oran and Constantine, valued for its regularity, safety, comfort, and accessibility, especially for people with reduced mobility. These features have significantly improved residents' mobility and contributed to a positive perception of the tramway.

Beyond transportation, the tramway has influenced socio-ecological transitions and urban development. It has spurred the creation of new commercial zones, particularly around stations, while some adjacent shops have been negatively affected. The tramway also enhances the modern urban image of both cities, aligning with their historical significance, and has contributed to job creation.

Finally, the tramway presents opportunities for urban densification and the promotion of active transportation modes. It serves as a catalyst for sustainable urban development, facilitating the transition toward cities that are inclusive, safe, efficient, and resilient.

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