

The Tram as a Sustainable Mode of Mobility in the City Case of Setif- Algeria

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Abstract

Algeria, with large urban dynamics, is facing management challenges of urban mobility that has been almost neglected for decades. The tram, designed as a mode of transport and urban development tool, has demonstrated its effectiveness in many cities around the world. The tram project for Setif is today's subject and people wonder about its sustainability. This paper aims to analyse theoretical questions and define sustainable mobility strategies for urban development. Strategies for a sustainable mobility will be identified to implement effective solutions. An empirical research work is undertaken in order to collect information about the transport policy in Algeria, the mobility and the tram project in Setif as a case study.

This project targets a socio-economic development for the city, without neglecting aspects relating to quality of life, to social cohesion and heritage for future generations. The tram will allow doubling the transportation capacity while improving the conditions of comfort and security and also preserving the environment. However, the tram project is also a quest, as an opportunity to "rethink the city". This project will reorganize squares, parks and streets, landscape treatment and enhance the architectural heritage. The different actors should be involved in the process of management in order to implement a sustainable strategy for urban transport.



1. Introduction

Algeria, with a large urban dynamics, is facing management challenges of urban mobility that has been almost neglected for decades. It has undertaken in recent years, a rich program of improvement and modernization of urban transport infrastructure which serve to enhance and facilitate socio-economic living conditions of its citizens. The tram, designed as a mode of transport and urban development tool, has demonstrated its effectiveness in many cities around the world.

Hence, the analysis combines thus the typo-morphological approach of the built environment to the socio-spatial study. The principles of a policy for a sustainable mobility will be identified and that will help the implementation of effective solutions between the many components of sustainable development (economic, social, environmental and institutional).

2. Sustainable urban development

In this century, there is a need for a new urban ethic, based on the concept of social sustainable development that integrates the notions of social equity, environmental sustainability, economic efficiency, social integration in a multicultural context. Eventually, to implement a sustainable strategy, it is necessary to involve the different actors in the process of production and management of the city.

Basically, the sustainable urban development provides the city planners with new criteria of social and ecological rationality. Consequently, the concept of sustainability becomes the keystone of the urban development process.

Sustainability is built around the notion that decisions need to be made for the long term, for future generations and this involves not stopping growth but intelligent ways of handling existing growth – in short, smart growth. (Michael Batty, 2003)

A sustainable system is an integrated network of people, products, services and infrastructures that, as a whole, is consistent with the fundamental principles and characterised by low material-energy intensity and by a high degree of context quality.

2.1. Design for sustainability

A sustainable solution is a process that enable an actor (a person, a company, a community and/or a network of persons, companies and communities) to achieve a sustainable result in a sustainable way, i.e. adopting a sustainable strategy. A



sustainable solution is successful if and when a new (and more sustainable) combination of products and services is recognized by users as better than the existing one. In this framework, we may define the concept of design for sustainability as strategic design activity that transforms the existing systems and generates new ones characterized by low material-energy intensity and a high potentiality in regenerating-ameliorating contexts of life. (Manzini, 2006)

For instance: bicycles, trams and traffic information services are not sustainable per se, but they may be considered as components of a sustainable solution when they are systemized and applied in a given city. In fact, in this case, they may reduce the material, energy and transportation intensity of the whole urban system and increase its quality both on the physical side (less pollution) and on the social side (more opportunities for socialization). (Manzini, 2006)

2. 2. Theoretical framework

There is a great confusion in the fields of quality and sustainability in urban planning. According to Radberg (1996), much of this confusion stems from the fact that the theories are formulated on a very general and abstract level. There is a need for empirical facts, observations. In particular, there is a need for a theoretical framework concerning these empirical observations.

The aim of this research is to analyze theoretical questions and definitions concerning sustainable mobility strategies for urban development. The principles of a policy for a sustainable mobility will be identified and that will help implement effective solutions between the many components of sustainable development (economic, social, environmental and institutional).

The analysis approach and case study are developed, an empirical research work is undertaken in order to collect information about the transport policy in Algeria in general and the mobility and the tram project in Setif in particular.

To minimize the need for transportation, we have two strategies seemingly irreconcilable for the sustainable city. The first one is based on the concept of the compact city which implies a strategy of concentration and increasing urban density. The second one is based on the concept of the green city which implies a strategy of deconcentration and spreading out using the inbuilt land for local water infiltration and cultivation. This may be called “the density paradox”. (Radberg, 1996)

3. Planning and mobility

One of the major problems facing urban planning, in this 21st century, is



urban sprawl with its problem of urban transportation. The car here is seen as the dominant means of mobility.

Today, mobility is accused of many problems. The Motor Traffic has destructive effects on the urban and city life. Pollution, environmental damage, social and spatial segregation, road safety, abusive occupation of public space, fragmentation of urban life and citizenship are reported. The car is regarded as one of the main agents of these disorders and it appears as the enemy of the city, at least as a potential risk undermining the foundations of urbanity. On the other side, mobility is largely seen as an additional degree of freedom which is now available to the individual to broaden his areas of choice, to select areas where he wants to live and work and the various places he wants to attend for his relaxation and recreation.

One of the reasons why in Algeria so many interventions for urban development and regeneration continue to fail lies in their focus on the physical dimension. We would believe that the concept of sustainable development should take into account the specificity of the Algerian society: on the economic, social and cultural levels. The users' participation in the creation of their living environment is the best incentive for them to preserve it and give it a longer life. Living the process of your own environment birth makes it a part of your memory and sustainability follows.

3.1. Sustainable mobility strategies

According to the French center for Studies on urban planning, transportation and public facilities "Certu" in its report: Mobility and transport n° 1 in January 2008, Developing a strategy for urban transport in developing countries is based on several cross-functional objectives: (Certu, 2008)

- Provide a framework for strategic long-term action to anticipate needs, make substantial savings on investment and allow the drivers leveraged to yield their results.
- Approach the question of mobility in an integrated manner.

Mobility is too often reduced to the deployment of technical means or infrastructure without any action that addresses all factors. A transport policy cannot exist without an array of complementary, sustainable measures, from planning to implementation, not to mention evaluation, an indispensable step throughout the life of the projects.

- Propose a long-term strategy which ensures financial survivability and



sustainability, by developing equitable initiatives with funding that benefits everyone, especially the poorest inhabitants; this requires an urban project which respects and protects the environment and non-renewable resources.

- Work to reduce poverty by promoting access to employment, education and healthcare, by focusing on transport safety in specific urban zones and by making sure public transport fares are within reach for the poorest inhabitants.
- Improve safety for urban transport users by promoting crossover between action areas.

Any overall strategy for dealing with the development of urban systems should reconcile the local development concerned with social processes which take place in the city with policies designed to change its spatial form. It is this kind of view, looking in the direction of both space and society, which has so far lacked in conceptualizations of urban development.

4. Transport policy in Algeria

Until 1987, urban transport services were almost entirely provided by public operators that generally come under the control of local authorities.

Algerian cities have traits that are typical of North African cities:

- A rapid urban growth with an increasingly marked disparity between the centre which stagnates and the rapidly growing and under-equipped neighborhoods;
- The youthfulness of the population: 50% of the population is under 20 years old;
- 50% of travels are home-to-school trips;
- Low car ownership rate: Only 7% of households own cars;
- Insufficient supply and near permanent saturation of public transport services (0.3 bus per 1000 people on average, whereas the World Bank standard is 1 bus per 1000 people). (UITP, 2007)

The liberalization of the sector was immediately followed by the proliferation of private operators and an overall increase in supply (doubling the number of minibuses and taxis with more than 22, 000 taxis for the 6 main cities, half of which operate in Algiers). This led to a drop in the market share for public operators who lost their monopoly as the table above shows.

4.1. Mobility and the city of Setif

For some years now, Setif has been one of the wealthiest cities in Algeria. The Wilaya (state) has an estimated population of more than 1,450,000 and an



estimated area of 6,504 sq km. This helped it to profit from major projects. The town of Setif is located 300 km east of Algiers and at 1100 m of altitude. It has a major road network of national character: the national road RN5 linking Algiers to Constantine, the RN9 linking Bejaïa to Setif, the RN28 between Biskra and Setif, the RN75 between Batna and Setif. The road network is complemented by the track-Constantine to Algiers through Setif and by Ain Arnat airport. In addition, Setif is the town in Algeria closest to the East-West highway under construction.

This relay-city between the East and West and especially the North and South, is also an important communication crossroad, not only at the national level but also in the Maghreb (North Africa). This important network of communication will certainly be reinforced after achievement of the East-West freeway project and the airport that is located at 10 kilometers away from the city. (Madani, 2002)

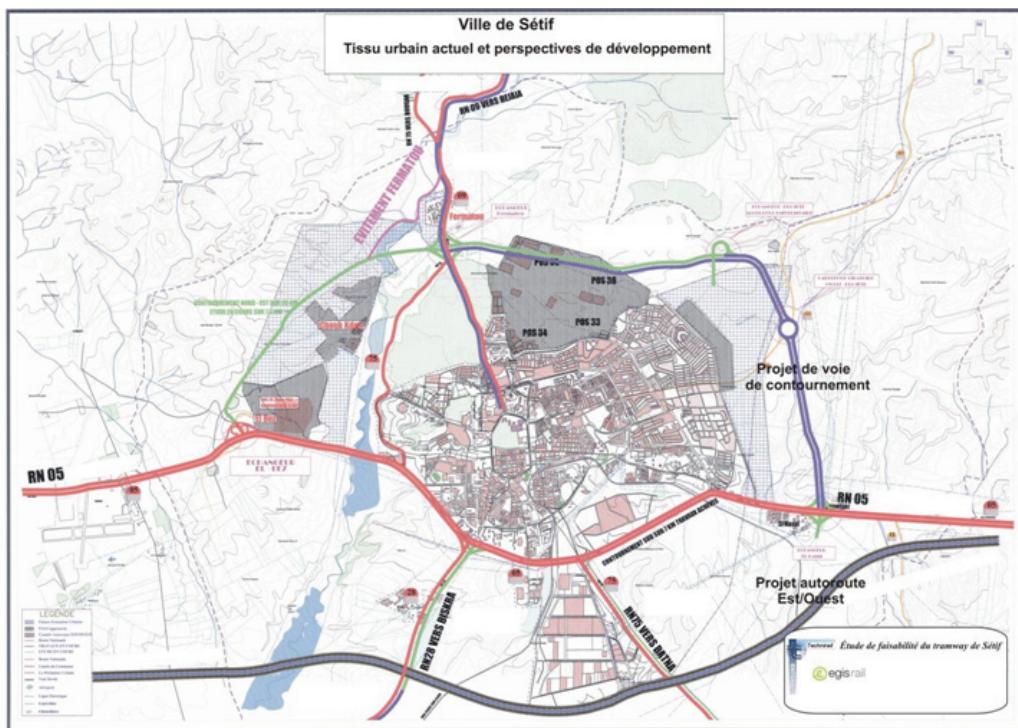


Figure 1: The existing urban fabric & development perspective of Setif (Source: URBASE, 2007)

Locally, the city has in the southern side a bypass 2 x 2 lanes designed mainly to facilitate the traffic on the RN5. A bypass by the Northern side is underway. Two parts are concerned with the extension of the town of Setif: The North-East part (El Hidhab side) and the South-West part (El Bez, Chouf Lekdad side).

The town of Setif, organized around a historic central core, is composed of former colonial neighborhood and a leisure park located on the site of a former barracks. A first crown or belt consists of neighborhoods, each with their specificity.

Beyond this crown, an industrial and tertiary district is located south along the RN75 in the western side. The city has grown to the east side with many dense



residential areas. Recently, the city has crossed the Bousellam River on the west side, with the founding of a university which will be accompanied in a short term by a medical center, a sports facilities and a residential neighborhood.

Hence, the two sites of Chouf Lekedad and Ouled Saber are designated to absorb the future expansions: Chouf Lekedad with 7,200 people in 2000 and about 25,000 in 2010 is situated on the western uplands of the city and already reached by the sprawl of Setif city, and the Municipality of Ouled Saber with 12936 people in 2007 and about 16559 in 2020 is situated in the East.

Table 1: Estimated Municipal population by 2015

	2007	2015	2020	Evolution 2020/2007	
				Growth	%
Setif	297107	358 133	405 590	108 483	2.42 %
El ouricia	17950	18 529	22 065	4 115	1.60 %
Ain arnat	39968	42 000	54 651	14 683	2.44 %
Mezloug	16117	16 604	19 559	3 442	1.50 %
Ouled Saber	12936	14 375	16 375	3 439	1.83 %
Area of study	384 078	450 221	518 240	134 162	2.33 %

Source : DPAT, Wilaya of Setif, 2008

The green valley along the Bousellam River, with a forest, is preserved. It will even be equipped with playful activities for the inhabitants. The Eastern extension will continue with the construction of a new university campus, residential neighborhoods and a new modern neighborhood known as La Colombe. In the mid term it is planned to urbanize Gaoua plateau located in the northern part of the city.

The number of jobs in the city of Setif will increase at the same time from 60 000 to almost 100 000 and the number of students will pass from 50 000 to over 100 000.

Table 2: Estimated employment creation for 2015 and 2020

	2007	2015	2020
Setif	58421	78789	97342
El Ouricia	3231	9706	4854
Ain Arnat	7194	8400	12023
Mezloug	2901	3321	4303
Ouled Saber	2328	2991	3603
Total area of study	75075	97207	122125

Source: DPAT, Wilaya of Setif, 2008

The Wilaya of Setif, second in the country in terms of population density, has



about 2,200 public transport vehicles and about 600 urban transport lines. A local transport corporation with 25 new and adapted buses has been set up in 2008. This corporation is placed under the supervision of the Ministry of Transport and managed by an administrative council which represents local Authorities. Moreover, feasibility studies for tram projects in Setif have been carried out.

Table 3: General characteristics of public transport in 2007

Type and Nbre of Lines	Average line Length km & total	Average time/ total time	Bus park	Total capacity	Total places offered	Average Nbre of Rotations/ day	Total places used
Private 18	9.2 165.9	37.4/ 187	361	24713	333328	11	197800
Public 05	7.6 38.1	43.4/ 594	27	2700	37800	14	21150
Total 23	8.9 204	43/781	388	27413	371128	12.5	218950

Source: EGIS RAIL / Transurb –Technirail, 2007

Currently, there is a network of public transport with buses composed of 23 urban lines with 388 vehicles operated by almost the same number of operators. If the network meets throughout the spatial and quantitative terms the needs of the population, however, its service quality is poor with high waiting time and a very low comfort. However, the new public operator ETUS has put up with new lines and especially a new fleet of vehicles.

The main lessons learned are:

- The road network functions with a relatively correct level service. This is due to its good geometrical characteristics and on the other hand, the levels of traffic in general are still acceptable compared to the offered capacities. Traffic surveys have shown that the different routes of the network support all motorized vehicle.
- The congestion that occurs on the network is not due to lack of capacity of current sections but is often influenced by the parking, pedestrian crossings poorly organized , crossing conflicts at the intersections. Improvements can be obtained through the study and implementation of a traffic plan.
- The public transport network by bus meets spatially and quantitatively the needs of the population. The mobilized bus fleet is important with 385 vehicles a total capacity of 26845 seats. However, the quality of service is poor, the waiting time at the stops outside the city center is very high, very old buses with an average age of 16 years and offering no comfort, lack of hygiene in vehicles, lack of amenities and of appropriate facilities at the bus station, etc.



Table 4 : Split modal of motorized modes in 2007

Mode	Number of trips/day	%
Public transport by bus	150925	51
Employer transport	7066	2
University transport	11014	4
Total collective transport	169005	57
Individual car	112752	38
taxis	11940	4
Other individual means	3841	1
Total individual modes	128533	43
Total motorized modes	297538	100

Source: EGIS RAIL / Transurb –Technirail, 2007

5. The tram project of Setif

With all its new major projects Setif is becoming a regional metropolis. One of these great structuring projects is the future tram of the city. It is a powerful means of transport and urban development, this innovative project will help the city to fully ensure its role as the capital the high lands, to meet the increasing needs of mobility. According to the data of 2004, the city of Sétif recorded a daily mobility of 2.32 trip /day. The Motorized mobility rate in 2007 is 0.77 and 300 000 motorized trip/day.

Considering its impact, it is one of the most important projects since 2007. It is conducted by the consulting firm Franco-Belgian and the construction of this project will be done in the next five-year program 2009-2013.

The tram project of Setif has entered its “phase of implementation”, following the adoption of the feasibility study. The study project of the tram took nearly 9 months in accordance with the agreed deadlines. The design is supposed to take all the necessary elements and constant officials’ recommendations of the Wilaya to integrate this new mode of transport in the existing fabric and allow it to reach populated areas of this great city with high mobility.

Thus a comprehensive option of 3 lines covering large areas of this city has been chosen for the tram allowing easy access to the downtown, with priority in achieving a first main line of 15 km that will cross the city by the major boulevards to the “El Bez” pole in the west part of the city which includes, major facilities such as the university and the medical and sports centers to the “east” part of the city in a global scheme connected to other infrastructure.



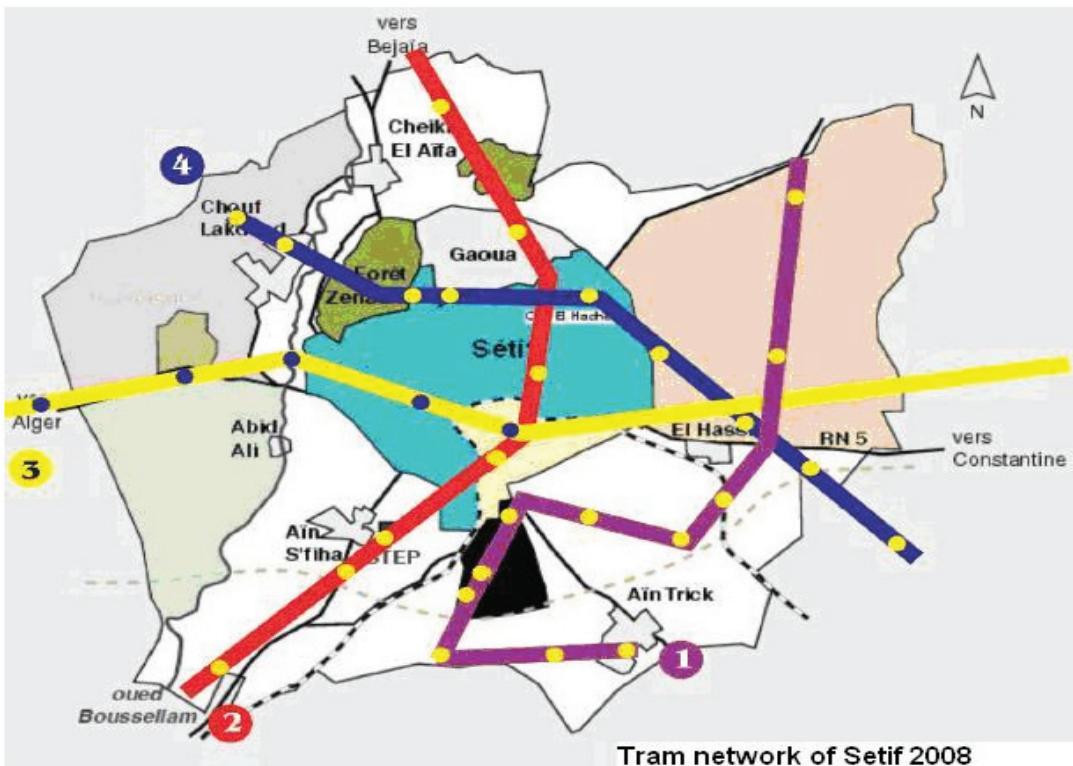


Figure 2: The first alternative of the Tram network project of Setif in 2007
(Source: EGIS RAIL / Transurb –Technirail, 2007)

The first axis which will be supplemented by two other lines going in opposite directions to cover the third university pole “El Hidhab” and serve many areas of the city from the northern part to southern one. This first line will have on its 15 km, 30 stations for a capacity of 5,000 passengers per hour per direction with an appropriate and functional integration and also Parks to better regulate the traffic within the downtown.

The Wilaya took the decision to immediately preserve all spaces and reservations affected by the achievement of the tram project and advocate already the implementation to inform the general public of this great structuring project. The Wali also took the decision to engage quickly with the city hall, a transportation plan that must go with the construction of such a project whose investment cost is estimated at 37 billion Dinars (400 million euros).

- Tram project objectives:

- Better capacity of transport and a possibility for any future extension of the network.
- Improved accessibility of peripheral districts: housing groups: the 1000 housing units, 1014 housing units, 1006 housing city, the El Hidhab city, etc.
- Improved inter modality: linkages between the transport networks (after reorganizing the lines of transport by bus, taxi, car and rail... and multimodality with



the creation of relay parks in the city main entrances in connection with tram stations.

- Better accessibility to the center and the periphery.
- A better contribution to the improvement of the living frame “public service”.
- A lower cost for local authorities.

5.1. A sustainable urban project

- A new public transportation network:

Building the tram in Setif provides the opportunity to create a new high-performance public transportation network, to rethink the city, enhance its attractiveness and free up public spaces. The first line (East-West) will provide service to the main residential and business sectors of the town. It should be used by travelers daily. The existing bus network will be restructured and improved, with the objective of increasing the transport quality.

- Linking the neighborhoods of Setif:

The Tram project creates a link between the city area's development projects: indeed, the first running line will provide service to the major slated developments of the greater Setif area, like the 1014 units, the city center and new amenities at El Bez and Chouf Lekdad, for instance...

By promoting the mobility of the isolated or abandoned population in the suburbs, all the city inhabitants will have an easy and quick access to the downtown and others districts.

- A social project: A means of transportation based on solidarity

The tram is the opportunity to create a truly solidarity public transport network: Access ramps, wide corridors and well-laid out surroundings of the stations make access easier for people with restricted mobility, like pregnant women, the elderly, people with strollers, wheelchair users, and the hearing- and visually-impaired. Existing bus lines will run more often, enabling everyone to take advantage of the network.

- The economic effects of the Tram:

The Tram is a factor that can make local shops and businesses more dynamic, as well as contributing to the overall development of Setif. Indeed, all the assessments carried out in European cities which have chosen a tram show that commercial activity downtown experiences a sharp rise in the number of shoppers. There are more pedestrians; the city becomes more attractive, new shops set up, and so on.



- An environmental project: Better regulated car traffic

The Tram is a modern form of transportation, offering motorists in Setif an alternative to using their cars: since it has right of way at all intersections and runs in a separate right-of-way lane, light rail is faster and more efficient than taking your car (punctuality, no parking hassles, less expense). The electrically-powered Tram does not produce any greenhouse gases, thus helping protect the environment by reducing urban pollution.

- An improved life setting as well as its beneficial effect on air quality, a tram can also improve the living environment of the Setifians. The implementation of an effective planning process will contribute to a new quality of life brought by the tram. The tram creates an opportunity to rethink and embellish the city and makes it more beautiful with high-quality developments and facilities, offering pedestrian areas and bike lanes, creating works of art, etc.

As a tool for urban planning and Beyond its “green” benefits, the tram can also redesign the urban space, with a clear tendency to density the city, while making neighborhoods more accessible. Along the tram lines, Setif will benefit from the redevelopment and re-promoting of the crossed areas, while respecting the identity of each quarter.

6. Conclusion

The responsibility and legitimacy of the local Authorities depend upon their ability to control the future of their city. Such type of actions help to lay sound basis for a sustainable urban development that serves the setifan citizen.

The local authorities of Setif have played an important role in the definition of the tram project objectives and are strongly supporting it, due to its great commitment in providing the city with a new sustainable transport mode. The need of car restriction measures, parking restraint and new pedestrian areas is very obvious. The change of behavior of those who use private transport to travel and to work will bring an improved quality of life to those who live in Setif.

The Tram project will enhance the sustainability of Setif by:

- Creating a new high-performance public transportation network,
- Promoting the mobility of the isolated or abandoned population in the suburbs of Setif.
- Making local shops and businesses more dynamic, as well as contributing to the overall development of Setif.



- Protecting the environment by reducing urban pollution, the Setif Tram is electrically-powered and does not produce any greenhouse gases.
- Reorganizing new street surfaces, expansion and renovation of sidewalks, establishment of new urban furniture, creation of pedestrian urban spaces.
- Creation of station with modern design.
- Installation of integrated lighting facilities.

All districts crossed by the tram lines will receive embellishments, including major avenues and land mark squares in Setif such as the main Avenue of 8th Mai 1945 which is the heart of the city. The passage of the tram is a major challenge for this large avenue. It will host pedestrians and tram promoting commercial activity of this axis.

Eventually, to implement a sustainable strategy, it is necessary to involve the different actors in the process of management of the city of Setif, and that involves transparency of administration; people must know the bases for decisions, rules and actions, and these bases must be given in advance, in a comprehensible form, and must be adhered to. Without transparency and predictability, people can not plan their own futures.

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ال ترام كوسيلة مستدامة للتنقل في المدينة حالة سطيف الجزائر

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الملخص :

الجزائر، بديناميات حضرية كبيرة ، تواجه تحديات في تسخير التنقل الحضري الذي كان تقريبا مهماً لعقود من الزمن. الترام ، المصمم كواسطة للنقل وأداة للتنمية الحضرية ، أثبتت فعاليته في كثير من المدن حول العالم. يشكل مشروع الترام و استدامته بسطيف موضوعا يوميا للنقاش.

تهدف هذه الورقة إلى تحليل المسائل النظرية وتحديد استراتيجيات التنقل المستدام لتنمية حضرية. سيتم تحديد استراتيجيات لتنقل مستدام بغية تقديم حلول فعالة. كذلك يجرى بحث تجريبي لجمع معلومات عن سياسة النقل في الجزائر، التنقل و مشروع الترام بسطيف كدراسة حالة.

يهدف مشروع الترام إلى تنمية اجتماعية و اقتصادية للمدينة، دون إغفال الجوانب المتعلقة بنوعية الحياة، التماส克 الاجتماعي والإرث للأجيال القادمة. سيضاعف الترام طاقة النقل مع تحسين شروط الراحة والأمن والحفاظ على البيئة. يعد مشروع الترام فرصة أيضا لإعادة التفكير في المدينة. كذلك هذا المشروع يسمح بإعادة تنظيم الساحات والحدائق، الشوارع والمناظر الطبيعية وتعزيز التراث المعماري.

ينبغي إشراك مختلف العناصر الفاعلة في عملية التسخير لتقديم إستراتيجية مستدامة للنقل الحضري.

