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A SENSITIVE APPROACH TO IDENTIFY BLACK SPOTS IN URBAN TRANSPORT, WITH APPLICATION TO CITIES IN ALGERIA

Summary. Global population growth and rampant urbanization have led to the accelerated development of large cities, which are themselves rapidly affected by a sudden increase in transport demand, or even a disruption of the daily concerns of citizens and the economic growth of the country. Currently, management of urban transport is a major issue in terms of the quality of life for citizens and the economic, social and cultural competition between the different cities. In many parts of the country, cities are booming, which has caused a major disruption in traffic. In spite of investments and development on urban layout, planning and development of means of transport in many cities of the country are faced with problems of massive influx of users, traffic jams, congestion, traffic accidents, and air and noise pollution. However, it should be mentioned that the problems are not identical and each city has its own specificities. The proposed working methodology is based on the identification of the problems in the field reported in the various national media and newspapers, grouped into five groups mentioned in the working approach. These are the black spots recorded in some wilayas of the republic, especially the big cities (Algiers, Constantine, Setif ...). Knowledge of the magnitude of the factors present on the ground makes it possible to have an overview of the malfunctions, or even perform « mapping of the black spots » to better choose the best directions to take. Thus, this study aims to highlight some of the urban transport problems encountered in certain Algerian cities and to then suggest possible solutions, or even identify actions to be undertaken on a priority basis currently and in the future.

1. INTRODUCTION

Global population growth and rapid urbanization have led to a sped-up development of large cities, which have been rapidly impacted by a sudden increase in demand for transport, i.e., infrastructure and services whose provision has been lagging far behind. Transport management is now a major necessity for improvement of citizens' daily life and competition between different cities. Efficient transport is clearly a fundamental aspect of good quality of life of every citizen. In many parts of the country, cities are exploding, which has led to huge traffic disruptions, causing traffic problems, resulting in greater disruption to the daily life of the citizen and the community. As a result, and despite investments and development on urban layout and planning and development of means of transport, many cities in the country are facing problems of a massive influx of users, congestion, traffic accidents, and air and noise pollution. Therefore, a unified approach to integrating multimodal traffic and an efficient supply network needs to be adopted, besides raising public awareness of self-disciplined behaviour. Thus, well-conducted urban planning has considerable implications for the growth of businesses and the profitability of citizens' daily lives. In this area, safety, comfort, availability, punctuality and quality of transport play a key role. However, it should be mentioned that the problems are not identical everywhere and each city has its own specificities, especially with the lifting of the state monopoly on

public transport activity and it's opening up to private investment in 1988 while going through a phase of total, or even unrestricted, opening up of the urban passenger transport market [1].

Increased corruption in the sector has led to overlapping competences, prerogatives and disparities in the objectives to be achieved for the development of the sector [2]. Through this work, we attempt to highlight some urban transport problems encountered in certain Algerian cities, in an effort to come up with possible solutions. It is recommended to first identify all the factors having a negative impact on the urban transport climate and then to identify the actions to be undertaken on a priority basis.

2. METHODOLOGY OF WORK

We base the proposed working method on identifying and reporting urban transport problems in the various national media and newspapers. This type of observation is advantageous, as it does not influence the observed situation: it remains true to the reality of the phenomenon studied, which increases the reliability of the results. This provides a real picture of a situation. These are the black spots recorded in some wilayas of the republic, especially the big cities, grouped into five groups mentioned in the working approach, Fig. 1. The wilaya is a territorial public authority with legal authority and financial autonomy. It constitutes an administrative district of the state [3]. As a result, a qualitative approach based on a case study seems to be the most suitable for conducting this research, given the geographical nature of the Algerian context [4]. This work is based on the use of statistical data as an effective instrument in our case study to answer research questions pertaining to “what”, “how” and “why” [5]. This qualitative research offers a global vision and a learning tool for local authorities. To act effectively, this technique must be part of a continuous improvement process: we measure, we act and then we observe the effects and the progress.

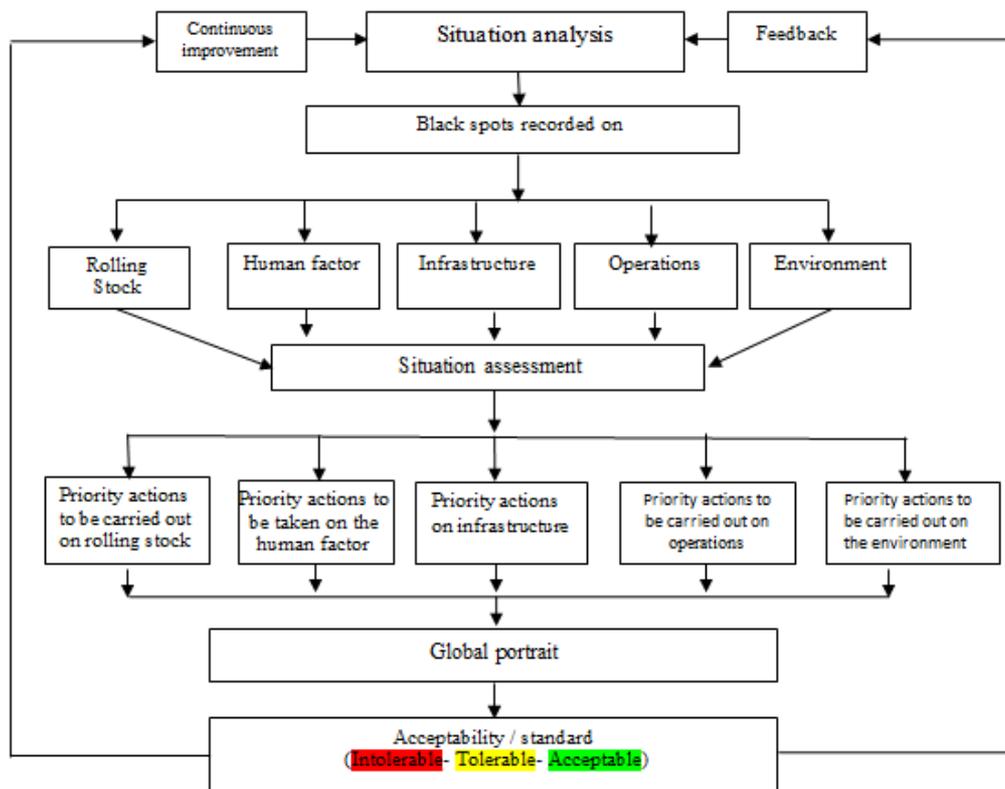


Fig. 1. Proposed work methodology

It is a systematic approach to problem estimation that comprises measuring and categorizing the factors that have a negative impact on the urban transport scenario based on an informed judgement in terms of both consequences and relative importance [6]. It is a quantitative and graphical method that

can help local authorities to prioritize and manage the dominant factors negatively affecting urban transport [7]. This technique allows us to take stock of each source of the problems (rolling stock, human factor, infrastructure, operations and environment). Thus, these conditions must be known and controlled by the authorities to offer citizens a high quality of traffic and mobility, or even to increase the positive atmosphere conducive to mobility [8]. Subsequently, knowledge of the factors prevalent in the field provides an overall view of the “black spots”, which is crucial to better choose the best directions to take, as a localized problem could be quickly resolved. It is also useful to periodically monitor black spots to detect any changes throughout the network [1]. In addition, this overall view of the “black spots” makes further arguments about the need for action. It allows to have a presentation which makes easier identification of very concrete problems, rooted in the specific characteristics of the development in the field and in the experience gained. A portrayal of black spots enables better identification of the priorities that need to be focused on in solving the actual problems that have a negative impact on urban transport [9].

3. ISSUES RAISED

Our work is based on an inventory of the problems in the field reported in the various media and national newspapers (La liberté, El-watan, La tribune, journal open edition, Algeria-watch, Reflexion dz, Le matin, Le temps, Alg-focus). These are the black spots recorded in some wilayas of the republic, particularly in the big cities. In Table 1, we present the problems identified.

Table 1

Black spots registered

Wilaya	problem categories	Black spots identified	References
Wilaya of Constantine	Infrastructure	Lack of regulatory stations. Lack of road signs at intersections.	[10]
	Operations	Lack of control of private transport in the field. Lack of traffic plans for new urban centres.	
	Human Factor	Proliferation of illegal transport.	
	Environmental factors		
	Rolling Stock	A city with 50,000 taxis, of which 2,800 operate in the city centre.	
Wilaya of Algiers	Infrastructure	Lack of traffic lights. Urban maritime transport capacity is low. Bus and taxi ranks have mostly disappeared due to the low fuel prices of cars, which are far too numerous for the capacity of the roads.	[11-17]
	Operations	Bus service is very slow, irregular and overcrowded. Lack of coordination between transport networks. Urban travel plan that does not take into account the needs of citizens. Energy and space consumption. Public transport is almost non-existent in some regions. Non-surveillance of the private sector. Poor organization of public transport.	

		Long waits at the stations and also long travel times.	
	Human Factor	Accidents and social inequalities. Lack of professionalism of staff. Problems with illegal transport.	
	Environmental factors	Local and global air pollution. Noise.	
	Rolling Stock	Public transport system is no longer able to provide a satisfactory level of service for travellers. Deterioration in the condition of buses. Non-conformity of the type of vehicle operated with the standards. Poor safety conditions. Buses do not offer the desired comfort and security.	
Wilaya of Oran	Infrastructure	Road network is faulty and saturated, and the main roads are almost impassable. Parking and security issues.	[18-20]
	Operations	Long queues at bus stops during rush-hours. Insufficient buses. Many Oranese communes remain inaccessible. Deficit in the number of buses, combined with a poorly organized rotation system.	
	Human Factor	Quality of service that is very often unacceptable. Illegal taxis impose their diktat in these situations.	
	Environmental Factors		
	Rolling Stock	Poor condition of buses.	
Wilaya of Setif	Infrastructure	Transport plan of the wilaya is not on the agenda.	[21]
	Operations		
	Human Factor	Aggressiveness of personal's transport.	
	Environmental factors		
	Rolling Stock	Used buses.	
Wilaya of Guelma	Infrastructure	Tangled lines are no longer a problem with narrow tracks. Problem of bus stops due to the choice of their installation in their corridor.	[22-24]
	Operations		
	Human Factor	Number of traffic accidents caused by buses.	
	Environmental Factors	Polluting nature of these buses.	
	Rolling Stock		
	Infrastructure	Rarely used bus stops.	[25]
	Operations	Increase in the number of cars on the road.	

Wilaya of Batna	Human Factor	Incivility of the drivers and receivers.	
	Environmental Factors		
	Rolling Stock	Poor condition of buses.	
Wilaya of Tizi-Ouzou	Infrastructure	Parking problems.	[26,27]
	Operations	Problem of travel time and waiting time at stations. Lack of a traffic plan. Illegal carparks.	
	Human Factor	Problem of illegal transport.	
	Environmental Factors		
	Rolling Stock		
Wilaya of Skikda	Infrastructure	Traffic lights are almost all out of order. The unsuitable choice of poorly frequented parking places does not suit users or bus drivers.	[28,29]
	Exploitation	More waiting and fewer transport options available.	
	Human Factor		
	Environmental Factors		
	Rolling Stock		

After analysing these identified black spots, we have grouped them into five categories of problems mentioned in the work process, Table 2.

Table 2

Grouping of Common Problems

Categories	Problems identified
Infrastructure	Parking problems; absence of road signs (traffic lights); Road saturation; Road damage.
Operations	A deficit in the number of buses, combined with a poorly organized rotation system (no more waiting at stations and travel time); Lack of a traffic plan; Poor control of the private sector.
Human Factor	illegal transport; Lack of professionalism of transport personal ; Bus accidents caused by drivers.
Environmental Factors	Local and global air pollution; Noise and vibration pollution.
Rolling Stock	Deterioration in the condition of the rolling stock

4. ANALYSIS AND RECOMMENDATION

4.1. Analysis

Urban transport management requires continuous improvement; we must therefore prioritize the actions to be undertaken in our action plans for effective management. Therefore, a prioritization strategy is needed that will give stakeholders a level of confidence and provide the requisite information; one such technique is the Moscow prioritization method [30]. It is widely used as a simple approach to

prioritize requirements in an iterative context. Therefore, we have used the (20/80%) theory [30, 31] and the Moscow method to prioritize and rank the most affected points for effective management without neglecting the daily preventive and corrective actions. With the help of this tool, we can build up the knowledge needed to control certain black spots in urban transport, and even to draw up a map of the black spots to prioritize the actions to be taken immediately; this is shown in Figure 1. From now on, this approach offers a global vision and a learning tool for local authorities. It enables the creation of a list of dysfunctions and to prioritize the actions to be taken in the various urban transport action plans based on the reality in the field. It represents a source of progress and continuous improvement in urban transport [32, 33].

The problems were grouped into categories, and priority actions were identified on a 20/80 basis. The results are shown in Figs. 2 and 3.

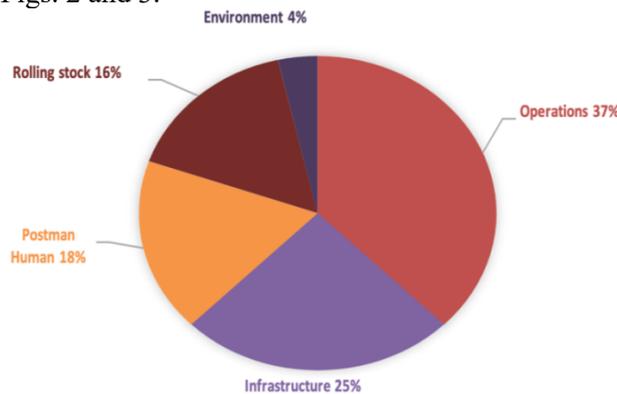


Fig. 2. Breakdown of problems into categories

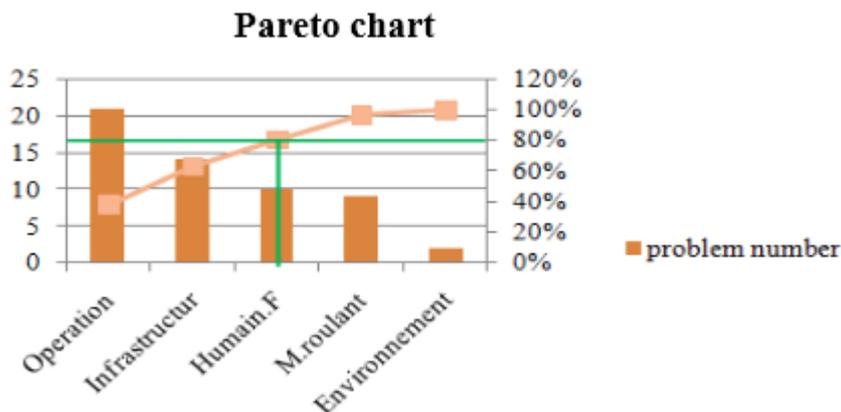


Fig. 3. Priority issues to be resolved

The analysis shows that the black spots and problem areas that need to be addressed first are operational infrastructure and human factor issues. Efforts should be focused on these areas without neglecting the daily preventive and corrective actions for the other problems. The resolution of these prioritized problems can positively influence the resolution of the other problems. As urban transport actions are a source of progress and continuous improvement, we propose an approach inspired by Pareto's escalator that meets these requirements, Fig. 4.

This approach proposes to climb the steps of efficiency by saving efforts on actions of lesser value [34]. The principle is simple: lighten the bottom of each step to allow it to rise. It is an iterative process that consists in renounce actions on the problems of a category, by reducing the time dedicated to others, to focalize efforts in the aim category. For our case, we distinguish 3 categories of action, namely [35]:

- Essential Actions: actions of prime interest and urgency. This focuses on the top-priority issues identified by the Pareto analysis and the Moscow method. These are the actions related to operational/infrastructure/human factor problems.

- Important action: actions that are of high interest, but that can be implemented because of the actions identified as essential. These are the actions on rolling stock problems.
- Desirable action: actions that are of definite interest, but that can be carried out if implementation possibilities arise. These are problems related to the environment.

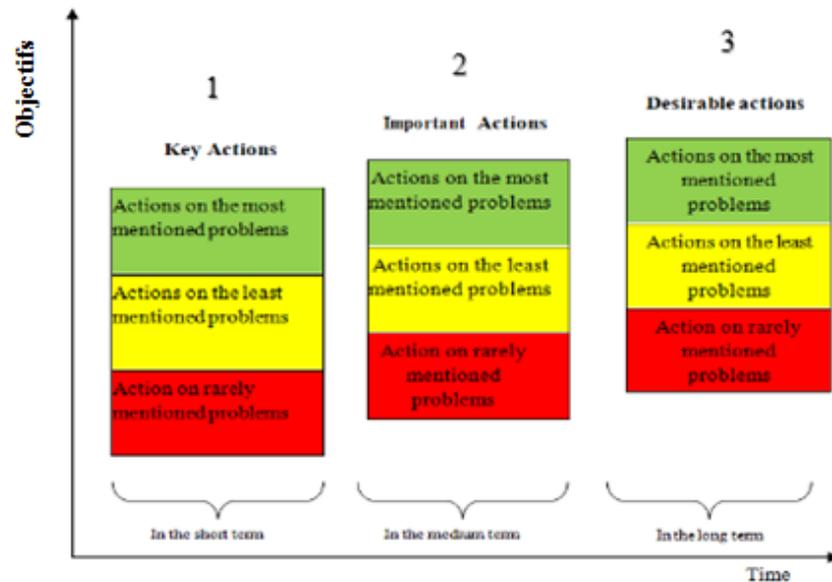


Fig. 4. How to climb the efficiency ladder

4.2. Recommendations

Based on these results, the predominant factors that emerged from the Moscow prioritization techniques and the Pareto chart that require essential actions are operational factors/infrastructure factors/human factors; we recommend the following actions.

4.2.1. For operational problems

In this category of problems, the recent introduction of the tramway in enormous cities has resulted in narrowing of the traffic lane and a significant number of buses are not allowed to serve part of the cities internally.

In addition, a significant proportion of citizens do not own a car and do not live along the tramway's route. As a result, the population faces significant social and economic difficulties, as the transport system depends mainly on the availability of private cars and buses that serve tram stops with use of the same ticket.

Therefore, with this change imposed by this new mode of transport, we suggest new organization of the traffic plan, while allocating a sufficient number and affordable rotation of buses to the most important tramway stations. The establishment of departure times is also important to ensure the reliability and efficiency of the network [36].

This step involves deciding the number of departures on each line and the time of each departure. The set timetable should best meet the needs of the users of the tramway network. In this way, we can make public transport more attractive by improving the quality of services and organization and thus encourage a significant number of citizens to use it more regularly.

4.2.2. For infrastructure problems

Urban parking problems are the most argued problems in this category. It is a structuring element in the functioning of the city and by its spatial influence; it represents a component of the urban landscape [37].

By exerting a “gate effect”, it strongly determines accessibility to the different urban functions and by exerting a “leverage effect”, it influences the modal choice of users’ movements and the distribution of traffic flows.

Parking is a major factor for a more sustainable development of the city. Thus, an efficient parking policy represents a long-term strategy [38]. However, this is not the case in our cities, where we find the availability of parking spaces with a remarkable disorder of parked vehicles, Figure 5. We have adopted two solutions: off-road and on-road parking.

4.2.2.1. On-street parking

We propose a parking system with differentiated zoning and the following zones [38]:

- short-term zone from 8am to 7pm, without residents, duration from 1h to 1h30;
- medium-duration zone from 9h to 12 and 14h to 19h, duration 2h to 3h; and
- long-duration zone from 9h to 12 and 14h to 19h, plus 5h.

Fee-based parking will bring about order in the current chaotic parking in city centres [39]:

- It will allow a faster turnaround and the sharing of public space between motorists wishing to park.
- It will improve traffic conditions and access to city centres, in particular, by reducing the amount of vehicles searching for free space.
- It will allow better monitoring of the areas subject to taxable areas and will facilitate control;
- The self-financing of the system is a strong argument for applying pricing.
- Paid parking will fight against the invasion of the anarchic parking lot on certain empty public spaces and will help to preserve it.

4.2.2.2. Off-road parking

For this component, we recommend a multi-offer parking system that meets the variety of use demand.

A classic offer is as follows:

- Reception of vehicles subscribed with a guaranteed place, not provided by the road system [38];
- Payment at the right price (for the time duration of parking);
- Unlimited parking time;
- Communication with the user (video, intercom);
- Adapted pricing (commercial, social ...); and
- Security (social control, remote surveillance).

Intelligent parking offer (reservation).

It is a car parking system based on allocation decisions and parking spaces allocated and reserved for drivers [40]. However, this system requires a platform that connects the different car parks with an information system. In addition, users have to download a certain application [41] that works with GPS and the location service.

4.2.3. For human factor problems

The problem of illegal transport is the most common in this category. They are an integral part of the transport supply; their share of the clientele is significant because of the lack of other legal modes of transport that do not meet the demand and the total absence of the latter on some routes [42]. Despite their usually stated disadvantages, the offers of illegal transport solve the problems [43]. In view of the flagrant lack of regularized taxi services, a system inspired by “illegal transport” [44] is necessary to organize and control them and to preserve their supply and guarantee flexible mobility for citizens.

- Its peculiarity is that the vehicles do not rotate constantly; they will systematically wait for customers at the stops before driving;
- This is a transportation service typically dependent on customer needs;

- When the vehicles arrive at a stop, they will try to pick up as many customers as possible and will only start their trip if the occupancy rate is above a certain threshold; and
- In this model, the vehicles will never serve a destination that is not requested by a customer.



Fig. 5. Parking spaces

5. CONCLUSIONS

The analysis shows that urban transport management represents, obviously, a fundamental aspect of the quality of life of everyone and a major issue for the quality of life for citizens and the competition between the different cities. In addition, the study highlighted the black spots and priority problem areas that need to be addressed, which are issues related to operations, infrastructure and the human factor. This is where the efforts of the authorities must be focused without neglecting the daily preventive and corrective actions for the other problems.

Here, the role of the press in the development of the nation's economy must be welcomed. This enables promotion of safe and sustainable development in urban transport.

In addition, this technique is part of a continuous improvement process: we measure, we act and then we observe the effects and the progress. Therefore, we drew a map of black spots highlighting some urban transport problems in some Algerian wilayas; this study makes it possible to identify the actions to be undertaken on a priority basis immediately and in the future. Thus, this work allows decision-makers to rank issues and black spots according to their gravity and importance from the field and identified by the various media. The European Commission has drawn up an action plan in line with the actions to be taken on a priority basis and thus to engage in a continuous improvement process based on the reality of the field and feedback based on experience. It must remain a source of progress and continuous improvement in urban transport. We can generalize this approach for all wilayas in the country.

References

1. Chabane, L. Le secteur privé des transports urbains de voyageurs; quelles logiques de fonctionnement? Une enquête auprès des opérateurs privés à Alger. *Les cahiers du cread*. 2014. No. 109. P. 89-119. [In French: Chabane, L. The private sector of urban passenger transport; what operating logic? A survey of private operators in Algiers].

2. Oumarou, A. & Babalola, A. & Bezabeh, G.B. TR Limited and BRRC, *Road Safety Manuals for Africa Existing Roads: Reactive approaches*. Côte d'Ivoire: African Development Bank. Department of Transport and ICT, OITC. July 2014. P. 124.
3. *Lexalgeria*. Le portail du droit Algérien: Loi n° 90-08 du 7 avril 1990 portant code de la Wilaya. [In French: *Lexalgeria*. The portal of Algerian law].
4. El Moustafid, S. & El Attar, M. Méthodologie de recherche par étude de cas dans les sciences de gestion au Maroc. *Conférence: Recherche en Sciences de Gestion: Contexte, Benchmark et Nouvelles Tendances, ISCAE*. Casablanca. 27, 28 février 2014. [In French: El Moustafid, S. & El Attar, M. Research methodology by case study in management sciences in Morocco].
5. Barlatier, P.J. *Les études de cas. Les méthodes de recherche du DBA. Collection Business*. September 2018. P. 133-146. [In French: Barlatier, P.J. *Case studies. DBA research methods*. Edition: Business Collection].
6. Hehenberger, L. & Harling, A.M. & Scholten, P. *Un guide pratique pour la mesure et la gestion de l'impact*. European Venture Philanthropy Association. Édition Juin 2015. P. 160. [In French: Hehenberger, L. & Harling, A.M. & Scholten, P. *A practical guide to impact measurement and management*].
7. Kharzi, R. & Chaib, R. & Verzea, I. & Akni, A. Safe and sustainable development in a hygiene and healthy company: using the decision matrix risk assessment (DMRA) technique "Case study". *Journal of Mining and Environment*. 2020. Vol. 11. P. 1-11.
8. *Partager la ville Comment sept villes ont su réinventer la mobilité pour tous*. Available at: https://www.xerox.com/downloads/services/ebook/sharing_the_city_urban_mobility_FR.pdf [In French: *Sharing the city How seven cities have reinvented mobility for all*].
9. Aouati, M.S. & Chaib, R. & Cozminca, I. & Verzea, I. Map risks in the company: highlight at the top priority risks. *World Journal of Engineering*. 2017. Vol. 14. No. 6. P. 550-555.
10. Betina, S. Le transport dans tous ses états à Constantine. *Liberte*. 01-28-2016. Available at: <https://www.liberte-algerie.com/est/le-transport-dans-tous-ses-etats-a-constantine-241024>. [In French: Betina, S. Transport in all its forms in Constantine].
11. Benelkadi, K. Transport, un secteur en mutation: La capitale face au fléau des embouteillages. *Elwatan*. 15 Décembre 2019. Available at: <https://www.elwatan.com/regions/centre/alger/transport-un-secteur-en-mutation-la-capitale-face-au-fleau-des-embouteillages-15-12-2019>. [In French: Benelkadi, K. Transport, a changing sector: The capital facing the scourge of traffic jams].
12. Kharoum, A. Feux tricolores dans la capitale : Serait-ce un projet mort-né? *El Watan*. 17 Novembre 2019. Available at: <https://www.elwatan.com/regions/centre/alger/feux-tricolores-dans-la-capitale-serait-ce-un-projet-mort-ne-17-11-2019>. [In French: Kharoum, A. Traffic lights in the capital: Could it be a stillborn project?].
13. de Trogoff, O. Les transports en commun d'Alger: une efficacité limitée? *Les clés du Moyen-Orient*. 16-09-2014. Available at: <https://www.lesclesdumoyenorient.com/Les-transports-en-commun-d-Alger-une-efficacite-limitee>. [In French: de Trogoff, O. Algiers public transport: limited efficiency?].
14. Baouni, T. & Bakour, M. & Berchache, R. Effets de la multi-modalité à Alger sur la mobilité des usagers. *Insaniyat*. 2013. Vol. 62. P. 45-69. Available at: <https://doi.org/10.4000/insaniyat.14298>. [In French: Baouni, T. & Bakour, M. & Berchache, R. Effects of multi-modality in Algiers on user mobility].
15. Chabane, L. La libéralisation du transport en Algérie a eu des conséquences négatives en terme qualitative. *Algeria-Watch*. 01-15-2017. Available at: <https://algeria-watch.org/?p=16597> [In French: Chabane, L. The liberalization of transport in Algeria has had negative consequences in terms of quality].
16. Zerrouki, N. Les habitants souffrent du manque de transport. *Liberte*. 15-02-2015. Available at: <https://www.liberte-algerie.com/actu-alger/les-habitants-souffrent-du-manque-de-transport-220094>. [In French: Zerrouki, N. Residents suffer from lack of transport].

17. Mokrani, K. Transport à Alger: le calvaire au quotidien. *La Tribune*. 09-07-2008. Available at: <https://www.djazairess.com/fr/latribune/2319>. [In French: Mokrani, K. Transport in Algiers: the daily ordeal].
18. Medjadji, H. Transports urbains à Oran : la galère des usagers. *Le Matin*. 05-11-2011. Available at: <https://www.lematindz.net/news/6108-transports-urbains-a-oran-la-galere-des-usagers.html>. [In French: Medjadji, H. Urban transport in Oran: the users' galley].
19. La rédaction. Transport à Oran: La galère au quotidien. *Algerie-Focus*. 07-12-2013. Available at: <https://www.algerie-focus.com/2013/12/revue-de-presse-transport-a-oran-la-galere-au-quotidien/> [In French: Writing. Transport in Oran: The daily hassle].
20. Hamdouche, H. Le problème de transport se pose avec acuité à Belgaïd. *Liberte*. 28-05-2018. Available at: <https://www.liberte-algerie.com/ouest/le-probleme-de-transport-se-pose-avec-acuite-a-belgaïd-293660> . [In French: Hamdouche, H. The transport problem arises acutely in Belgaïd].
21. Beniaiche, K. Situation alarmante du transport urbain à Sétif: Qui arrêtera les tacots? *El Watan*. 14-12-2019. Available at: <https://www.elwatan.com/regions/est/setif/situation-alarmante-du-transport-urbain-a-setif-qui-arretera-les-tacots-14-12-2019>. [In French: Beniaiche, K. Alarming situation of urban transport in Sétif: Who will stop the jacks?].
22. Dadci, K. Grève des transporteurs urbains à Guelma: 31 bus à l'arrêt. *El Watan*. 30-11-2019. Available at: <https://www.elwatan.com/regions/est/actu-est/ greve-des-transporteurs-urbains-a-guelma-31-bus-a-larret-30-11-2019>. [In French: Dadci, K. Urban transporters strike in Guelma: 31 buses stopped].
23. Baali, H. Absence de rotations nocturnes. *Liberte*. 29-04-2019. Available at: <https://www.liberte-algerie.com/est/absence-de-rotations-nocturnes-314882>. [In French: Baali, H. Lack of nocturnal rotations].
24. Gassem, H. Guelma: Carence et dysfonctionnement du transport urbain. *Réflexion*. 06-01-2010. Available at: <https://www.djazairess.com/fr/reflexion/3862>. [In French: Gassem, H. Guelma: Deficiency and dysfunction of urban transport].
25. Benyahya, A. La conduite anarchique des bus met sous tension le centre-ville de Batna. *Le Matin*. 23-11-2015. Available at: <https://www.lematindz.net/news/19148-la-conduite-anarchique-des-bus-met-sous-tension-le-centre-ville-de-batna.html>. [In French: Benyahya, A. The disorderly conduct of the buses puts pressure on the city center of Batna].
26. Hamri, Z.C. & etc. Le transport à Tizi-Ouzou: Un secteur en quête de solutions urgentes. *Le Temps*. 09-07-2018. Available at: <https://www.djazairess.com/fr/letemps/1018536>. [In French: Hamri, Z.C. & etc. Transport in Tizi-Ouzou: A sector in search of urgent solutions].
27. Tahraoui, A. Commune de Tizi Ouzou : Le plan de circulation mis aux oubliettes. *El Watan*. 18-09-2018. Available at: <https://www.elwatan.com/regions/kabylie/tizi-ouzou/commune-de-tizi-ouzou-le-plan-de-circulation-mis-aux-oubliettes-18-09-2018>. [In French: Tahraoui, A. Municipality of Tizi Ouzou: The traffic plan put in oblivion].
28. Boukarine, A. Un nouveau plan de circulation s'impose. *Liberte*. 11-12-2018. Available at: <https://www.liberte-algerie.com/est/un-nouveau-plan-de-circulation-simpose-305372>. [In French: Boukarine, A. A new traffic plan is needed].
29. Ouhab, K. Cité Boulkeroua à Skikda: Les transporteurs n'en démordent pas. *El Watan*. 21-07-2019. Available at: <https://www.elwatan.com/regions/est/skikda/cite-boulkeroua-a-skikda-les-transporteurs-nen-demordent-pas-21-07-2019> [In French: Ouhab, K. Cité Boulkeroua in Skikda: The transporters are not giving up].
30. Aïb, A. & Chaïb, R. & Verzea, I. & Cozminca, I. Mapping of Occupational Hazards at Palma Industrial Park Constantine. Algeria. Sustainable Development. In: *WIT Transactions on The Built Environment*. Ed. Brebbia, C.A. Wessex Institute of Technology. 2015. Vol. 168. P. 1075-1086.
31. Kharzi, R. & Chaïb, R. & Akni, A. Prioritizing the actions to be undertaken in health and safety at work: case study region of Tiaret. *International Journal of Law and Management*. 2020. DOI: 10.1108/IJLMA-01-2018-0009.
32. Laplante, D. & Mercier, M. & Huard, G. & Fortier, J.P. *Points noirs. Partie II*. Recommandations. Ministère des transports direction de l'observatoire en transport. Montréal. Janvier 1978. 63 p.

- [In French: Laplante, D. & Mercier, M. & Huard, G. & Fortier, J.P. *Black spots. Part II. Recommendations*. Ministry of transport management of the transport observatory].
33. Mancineiras, P. *L'évaluation d'un projet de transports urbains: Quelle méthodologie pour quels résultats? Le cas du projet Linéo à Toulouse*. Masterthesis. Lyon. 2017. 100 p. [In French: Mancineiras, P. *The evaluation of an urban transport project: Which methodology for which results? The case of the Linéo project in Toulouse*].
 34. Belorgey, P. *La boîte outils de la gestion du temps*. 2nd edition. 2019. 198 p. [In French: Belorgey, P. *The time management toolbox*].
 35. Affaires municipales et habitations Québec. *Les étapes d'une démarche intégrée de développement durable*. Available at: <https://www.mamh.gouv.qc.ca/municipalite-durable/entreprendre-une-demarche/etapes-dune-demarche/plan-daction/> [In French: Municipal affairs and housing Quebec. *The stages of an integrated approach to sustainable development*].
 36. Desfontaines, L. *Problème d'horaire d'autobus avec dépôts multiples et modification contrôlée des heures de début des voyages*. Thèse maîtrise sciences appliquées. Montréal. 2017. 98 p. [In French: Desfontaines, L. *Bus schedule issue with multiple depots and controlled change in travel start times*. Master of applied sciences thesis].
 37. Boujnah, H. *Modélisation et simulation du système de stationnement pour la planification de la mobilité urbaine : application au territoire de la cité Descartes*. PhD thesis. Paris-Est. 2017. 418 p. [In French: Boujnah, H. *Modelling and simulation of the parking system for planning urban mobility: application to the territory of the city Descartes*].
 38. *La réglementation du stationnement Point sur les différentes compétences: les différents types de stationnement*. Angers. 2018. 39 p. [In French: *Parking regulations Point on the different skills: the different types of parking*].
 39. Desvergnés, M.C. & Du Crest, T. *Les premières mises en place du stationnement payant sur voirie: quelle acceptabilité pour les mesures de tarification? Lyon: Centre d'études sur les réseaux, les transports, l'urbanisme et les constructions publiques*. 2000. 62 p. [In French: Desvergnés, M.C. & Du Crest, T. *The first implementation of paid on-street parking: what acceptability for pricing measures? Lyon: Center for studies on networks, transport, town planning and public buildings*].
 40. Geng, Y. & Cassandras, Ch.G. A new "Smart Parking" System Infrastructure and Implementation. *Procedia - Social and Behavioral Sciences*. 2012. Vol. 54. P. 1278-1287.
 41. Tikialine, Y. & Khedda, K. & Rebiai, M. *Etat de l'art de «Smart Parking», étude et conception d'un prototype de stationnement intelligent*. Thèse masters. Algérie. 2018. 86 p. [In French: Tikialine, Y. & Khedda, K. & Rebiai, M. *State of the art of "Smart Parking", study and design of a smart parking prototype*. Master thesis, Algeria].
 42. Lammoglia, A. & Josselin, D. & Faye, R.M. *Les taxis clandestins à Dakar: quel avenir pour ces Transports A la demande (TAD) urbain?* CODATU XV. Addis Abeba, Éthiopie. 2012. 20 p. [In French: Lammoglia, A. & Josselin, D. & Faye, R.M. *The clandestine taxis in Dakar: what future for this urban Transport on Demand (TAD)?* CODATU XV. Addis Abeba, Ethiopia].
 43. Godard, X. *Le transport artisanal dans les villes méditerranéennes. Compte-rendu du séminaire de recherche*. Maison méditerranéenne des sciences de l'Homme. Aix en Provence. 5 et 6 Juin 2007. 194 p. [In French: Godard, X. *Artisanal transport in Mediterranean towns. Report of the research seminar*. Mediterranean House of Human Sciences].
 44. Lammoglia, A. *Un modèle multi-agents pour l'étude des systèmes de transport flexible en milieu urbain*. France. Montpellier. 2017. P. 133-153. [In French: Lammoglia, A. *A multi-agent model for the study of flexible transport systems in an urban environment*].