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Understanding Walkability: Impact of Built Environment on Walking Practices in the City Centre of Constantine

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In the era of megacities, walkability is at the heart of urban planners' concerns, it is the value of urbanity. In recent years, walking seems to be one of the current concerns and issues of the urbanity; it is the subject of particular attention in urban studies as well as urban design, whose primary objective is to design urban forms more adequate to the scale of the pedestrian and the practice of walking. In order to understand the impact of the built environment on the practice of walking and walkability, we opted to study it in the city centre of Constantine, which encompasses two different urban forms, and due to its strong urban dynamics, is still suffocating under the weight of intense and uncontrolled pedestrian mobility and its particularly congested space. To this end, we carried out a walkability diagnostic, based essentially on various tools: counts, audit, and questionnaire. The results of the research show that in the city centre of Constantine, walkability is not limited to the built environment, which is a fundamental element for the good progress of walking. In fact, the combination of many external factors has an influence on the choice of pedestrians' movements, such as the motives for travelling, place of residence, etc.

Key words: walkability, urban form, walking, built environment, city centre, Constantine.

INTRODUCTION

Since the industrial revolution and the contributions of the second half of the 20th century, urban forms have been profoundly modified. Cities are designed and developed primarily to accommodate the free-flowing traffic of the automobile at the expense of the pedestrian. Walking is the fundamental natural mode of travel, the most compatible with other means of transport, it was most often taken into account in the ends of journeys made by other means of travel. Today, the issue of pedestrian mobility is at the heart of the concerns of cities. Walking seems once again to be seen as the mode of transport to be particularly encouraged, especially with the emergence of the new urbanism, whose objective is to seek to design urban forms that respect the scale of pedestrians and respond to their needs and those of future generations (Chettah, 2021).

We are interested in the ability of urban form to facilitate pedestrian movement, in other words, the pedestrian potential of the built environment or 'walkability', a recent multi-faceted concept that has been at the heart of research since the beginning of the 21st century. The term seems to have been first formulated by Jane Jacobs in 1961. After a few years, the term became the subject of a flurry of scientific research, Europe and in the Anglo-Saxon world in particular, including North America. It gained popularity among professionals in the built environment and in several research studies, which have enriched the literature enormously. According to Kayser (2008), walkability has been defined as the adaptation of a built environment to walking. «A walkable environment encourages walking not only for travel, but also for its social and leisure functions, which are enhanced through a quality environment, adapted to the scale of the pedestrian. The built environment can be described as the part of the physical environment that is shaped by human activity. (Saelens and Handy, 2008).

In such a context, how can a built environment influence walking and the choice of pedestrian travel routes? Are the most intense public spaces the most walkable? Don't factors external to the urban form play an equally or even more important role in determining pedestrian mobility? This research attempts to understand the impact of the built environment factor on the practice of walking and the tendency of individuals to use it as a mode of travel in public space. For this purpose, we have chosen a city that will help us to understand these factors. We chose the city of Constantine, the metropolis of eastern Algeria. In recent years, the city has undergone a strong urbanisation and a great economic

and social transfer, which has resulted in an increase in the volume of exchanges and the need for travel. This system is experiencing dysfunctions, namely congestion, degradation of mobility conditions in general and pedestrian mobility in particular. The walking is becoming very difficult and is now a major problem for the whole city.

THE CITY CENTRE OF CONSTANTINE: TWO DIFFERENT URBAN FORMS AND A COMMON PROBLEM

Most Algerian city centers resemble each other in their foundations and phases of urban development, thanks to their common history. When Algerian cities were taken over by the French, they were composed of typical traditional fabrics resulting from the development of traditional Islamic cities founded in the same sites on Roman cities (FEZZAI, 2018), and the greatest witness is the presence of ruins and in some cases of Roman monuments in our cities until today. These cities were originally Numidian, Roman or Arab cities built on their ruins. This reoccupation was encouraged by the attributes of the site, the layout of the roads and the accesses. After the French occupation in 1830, Algerian cities underwent drastic changes where the colonial urban model was superimposed on the indigenous city. This led to the emergence of an urban model that was completely different from the original character of the city, where the colonial city was superimposed entirely or partially on the local indigenous city. These cities were then restructured for military purposes and divided into two areas: one European and the other Arab, so that two different urban forms exist side by side. The two quarters are generally separated by streets or intertwined in places. Each district had its own facilities, but under the same colonial authority. Following independence, they went through a period of anarchy in the management of property and spaces and then a regulated period where redevelopment and restoration operations were applied (FEZZAI, 2018).

The city of Constantine, one of those Algerian cities, was the cradle of civilizations ranging from the Numidian civilization to the French colonization in 1837. Until then, the old city was the whole city. Each civilization had its own principles of construction and development on its site, which underwent changes and transformations throughout its history of over 2500 years (Hamouda. 2018). The passage of these various civilizations has given it its current physiognomy, where two heterogeneous urban forms (the old town and the Coudiat Aty) are morphologically linked by a buffer zone (the Breach) forming the city centre of Constantine (Figure 1).



Figure 1. The position of the two urban forms and the buffer zone in the city centre of Constantine (Source: author based on khenoucha base map, 2011).

The old city

or medina is the main nucleus of the whole city, a traditional medieval configuration dating from the Ottoman period, characterised by an urbanism of winding, maze-like streets and a dense fabric with a low architecture adapted to the Mediterranean climate. It is almost 25 centuries old, crossed by morphologically straight secants, but punctuated by the change of directions in some places, dating from the second half of the 19th century (Khenoucha, 2011). Indeed, this spatial model is conceived in relation to walking, however, given its complex and hierarchical tree-like road structure, it appears to be not very accessible and difficult to navigate.

The Coudiat-Aty

this entity is considered as the base of the first extramural extensions of the city. It is characterised by its checkerboard pattern with simple crossroads and an architecture of different modern styles through the numerous buildings that rise to the top. A colonial configuration belonging to a model of spatial production very different from the traditional model, resulting from the French colonial presence in Algeria (1830-1962), characterised, in addition to the attributes of colonial urbanism and architecture, by an adaptation of urban space to the new requirements of the motorisation of cities, thus reducing the importance given to pedestrian space in favour of new urban forms designed for the individual car (Boukelouha 2021).

The two urban forms are connected by a buffer zone: the Breach. This area is a central entity identified by a steep slope and very important escarpments, which has reinforced the inaccessibility of the site, as of all the accesses to the centre, only the one from the west is the least difficult. The buffer zone is the only route that connects the two entities, and being itself the crest of a bilateral escarpment. (Khenoucha. 2011). It is the crossroads towards which all the city's entrances and exits converge, and it is also the space where all the penetrating routes in the centre's fabric end, through which internal transit between the centre and the city's various districts or even between the city and other cities takes place. (Khenoucha. 2011. P184). The old town and the Coudiat Aty group together the main public administrative facilities and private activities, divided between the two, where the Coudiat Aty is distinguished by its administrative character, while the old town is characterised by its commercial dominance. This makes the city centre a place of attraction for a very large population from the wilaya and outside the wilaya, and attracts a very large pedestrian and mechanical flow, which causes difficult and very painful walking conditions, and makes its functioning problematic.

As in other cities around the world, after the advent of the Covid-19 epidemic, the usual lively face of the city centre has changed considerably. We have seen a clear decrease in pedestrian traffic, especially in the early evening hours, especially in the medina, where it has become known as the "ghost town". This change is mainly due to the severity of the epidemic and people's awareness of the need to avoid direct contact and infection. However, as soon as this critical phase ended, it gradually returned to its usual state. This centre, consisting of the medina and the Coudiat Aty, houses a wide variety of commercial and superstructure facilities of the municipality or region. It still retains its role as the city centre and remains the soul of the entire city, however it is particularly congested and suffocates under the weight of the ever intense car and pedestrian traffic, although lately there has been a transfer of activities out of the city centre and even out of the city.

METHODOLOGY ADOPTED FOR THIS STUDY

In order to answer our question, it is necessary to carry out a diagnosis of walkability, and also to evaluate the quality of walking. Our diagnosis is based on the criteria defined by the authors of the "New Urbanism" influenced mainly by the studies carried out by Lavadinho (2009), as well as those of the Centre for Research on Sound Space and the Urban Environment (CRESSON) (Ewing, Thibaud, 2001 and 2007; Thomas, 2010). These different studies take into account the influence of the built environment on walking to measure walkability. We made our diagnosis in three stages: Firstly, through our repeated visits, observation and counting in the field, we assessed the intensity of pedestrian flow, and as it is impossible to take into account the whole extent of the city centre of Constantine, we selected different public spaces: street, avenue and boulevard, which offer a variety of urban forms. We then measured the quality of walking through the development of our own walkability assessment grid, which we filled in ourselves and then applied to our selection of public spaces. Our audit grid was inspired by various comparative studies, and took into account the criteria most used by the audits already created, while remaining consistent with our objective. Finally, we conducted a questionnaire among users of the public space in the city centre of Constantine, which enabled us to understand the reasons for walking and the external factors of the built environment that encourage walking. Our sample was selected according to the random method and contained 201 respondents, 102 of whom were men and 99 women.

Counting the Pedestrian Flow

Given the size of the fabric and the complexity of its urban structure, it is impossible to take into account the whole extent of the city centre of Constantine. Thus why we have selected the main axes of the fabric or the axes of the dynamic space of the city centre, and some samples of the streets in each part of the fabric according to our repeated visits, field observation. In fact, our selection offers a variety of urban forms (between traditional and colonial), urban function, and spatial and urbanistic component. Our pedestrian flow counts were carried out in 17 different public spaces of our

selection in the city centre of Constantine, in the month of March 2022 between 8:00 am and 6:00 pm, at 34 counting points (see Fig. 5), in both directions, for 15 minutes per hour without interruption. The weather was relatively mild and pleasant, with favourable weather conditions: cold and dry in the morning and late afternoon, with no precipitation. In short, a climate conducive to shopping or strolling in a month outside the holidays. We have based our counts on a "week" period, excluding "weekends", in order to better understand the daily practice of pedestrian movements in the centre of Constantine, and avoiding all periods when events are taking place or days when the weather is bad. We selected five time slots as follows:

Morning: (08:00-09:00) and (09:00 - 10:00)

Morning: (10:30-11:30)

Mid-day peak period: (12:00-13:00) and (13:00-14:00)

Afternoon: (14:30 - 15:30)

Evening peak period: (16:00-17:00) and (17:00-18:00)



Figure 2. selected public spaces and the counting points. Source: Authors

We did our counts with the help of a team of observers under our supervision to ensure the credibility of the work. Each two observers regularly placed themselves at several points on the streets and carried out a 15-minute count at the two points on the same street at the same time. We have taken into account in our counting all categories of pedestrians who use the public space (children, adults and elderly, women and men, inhabitants, visitors, or others). The selected spaces are coded in order to facilitate their processing and comparison with the results of the walkability audit. Figure (2) shows the selected public spaces and the pedestrian flow counting points.

The Walkability Audit

We measured the quality of walking through the development of our own walkability assessment grid, which we filled in ourselves and then applied to our selection of public spaces. Our audit grid was inspired by various comparative studies, and took into account the criteria most used by the audits already created, while remaining consistent with our objective. Table n° 01 gives a total score of "walkability" out of /42, and each criterion is evaluated according to the same gradation, 0 being the worst situation and 3 being the best. The analysis of the results obtained will allow us to to carry out a rich and detailed diagnosis of the selected areas, in order to identify the various gaps and discover which criteria need to be optimised.

criterion	variable	method	criterion	variable	method
	Use of pavement (Presence of physical or psychological obstacles: goods, illegal parking, grouping of people, etc.)	0 - unable to use the pavement 1 - difficulty in walking 2 - minimal discomfort 3 - excellent quality		Vegetation	0: No trees or vegetation 1: 1 or 2 trees or vegetation per 100m 2: between 5 and 10 trees per 100m 3: more than 10 trees per 100m
Accessibility/6	PRM accessibility :	0 - No bollards for the visually impaired, floors, ramps, 3 - Presence of bollards for the visually impaired, floors, ramps,	Framing /3	Comfort (The degree to which spaces are visually defined by walls or trees)	0: Unframed space 1: Partially framed gap 3: Fully framed space
Connectivity /3	Possibility to choose a route	 0 - only one direction possible 1 - two possible directions 2 - three possible directions 3 - four or more possible directions. 		crossed	0 - impossible to cross 1 - difficulty in crossing 2 - minimal discomfort 3 - excellent crossing
Building density /3	Interpretation of buildings	0: Very low density 1: Low density 2: Medium density 3: High density		pavement	0 - no pavement 1 - Narrow pavement <120cm 2 - Normal pavement=120cm 3 - Wide pavement>120cm
Mix of functions /3	Number of functions available on site	0: No function 1: Only one function 2: Two to three functions 3: Four or more functions	Security /9	Traffic	 0 - heavy car traffic 1 - medium presence of car traffic 2 - light car traffic 3 - no car traffic (pedestrian zone)
	The H/L ratio (building height/width of the space)	0: H/L outside the range 0.5-2.5 3: 0.5 ≤ H/L ≤ 2.5		Pedestrian signage	0 - No pedestrian signs 1 - Minimal signage (white stripes) 2 - Good: Pedestrian traffic light 3 - Very good
Human scale /9 Echelle humaine	Street furniture (bench/ lighting/bin)	0 - no furniture 1 - minimal presence of furniture (1 or 2 /100 m) 2 - satisfactory presence of furniture (between 2 and 10 /100 m) 3 - strong presence of furniture Walkability of	Legibility /6	Tracking	0 - absence of an outstanding landmark 3 - presence of an outstanding landmark

Table 1. Walkability adult carried out for the study presence	Table	1. Walkability	audit carried	out for the	study presence
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Source: authors

RESULTS

Pedestrian Flow Intensity

The results of the daily pedestrian flow count show a large difference between the average pedestrian flows on the thirtyfour counting points (34 points) of the different selected areas (Figure 3), three categories of streets are distinguished:

The first category: this category is characterised by high values of pedestrian flow during the day, and high values of average pedestrian flow, where a maximum value of average pedestrian flow of 64.15 p/min had been recorded, with a maximum peak of 119.8 p/min between 12:00 and 13:00. This category includes the following main roads: Benboulaid Mostafa Avenue, 19 June 1965 Street, Didouche Mourad Street and Abane Ramdane Street.

The second category: is characterised by average values of pedestrian traffic, where Larbi Ben M'hidi Street records a maximum value of (29.65 p/m) with a peak of 44.8 p/m followed by Boudjeriou Messaoud Boulevard (27.67 p/m) and Beloiuzded Boulevard (21.45 p/m), the latter being characterised by luxury trade and a more intense functional dynamic.

The third category: includes the rest of the selected spaces, and shows low values of frequentation, relatively logical for both commercial streets and housing areas, with the lowest value of average flow being 4.17 p/min recorded on Benchicou Street.



Figure 3. The daily pedestrian movement of each selected space. (Source: Authors).



Figure 4 . Average pedestrian flow intensity (p /m) of public spaces during the whole survey week. (Source: Authors).

In the general classification of the colonial public spaces of our selection for which there was a pedestrian flow count, Ben Boulaid Avenue is the most frequented and occupies the first place with 64.15 p/min, and Zighoud Youssef Boulevard and Abdallah Bouhroum Street occupy the last place with 6.25 p/m. While, in the general classification of traditional public spaces, Rouag Said Street occupies the first place with 13.17 p/m, Sallahi Tahar Street occupies the last place with 5.35 p/m.

Walkability Scores





DISCUSSION OF THE RESULTS

According to the results of the walkability assessment (see Table 2), the built environment in the city centre of Constantine influences walking as follows:

Table 2. Comparison of the results of the walkability scores and the average intensity of pedestrian flow. Scores in red that do not obtain the average (Source: Authors).

criterion Public space	Accessibility/6	connectivity /3	building density /3	mix of functions /3	human scale /9	Framing/3	Security /9	Legibility /6	Walkability score /42	pedestrian flow (m/m)
1- Zighoud Youcef boulevard	2	3	2	2	4	1	2	3	19	6,25
2- Bouatoura Meriem street	1	3	3	2	1	3	2	3	18	8,85
3- Abdallah Bouhroum street	1	3	3	2	4	3	3	3	22	6,25
4- Didouche Mourad street	1	3	3	3	4	3	4	3	24	56,6
5- 19 juin 1965 street	1	3	3	3	4	3	4	3	24	54,075
6A- Larbi Ben M'hidi street	1	3	3	3	4	3	2	3	22	29,65
6B- Larbi Ben M'hidi street	1	3	3	3	4	3	2	3	22	14,675
7- Benchicou street	1	2	3	2	0	3	4	0	15	4,175
8- Mellah Slimane street	1	3	3	2	0	3	4	3	19	9,075
9- Sellahi Tahar street	2	2	3	2	0	3	5	0	17	5,35
10- Hadj Aissa street	1	3	3	2	1	3	4	3	20	6,7
11- Rouag Said street	1	3	3	2	1	3	4	3	20	13,175
12- Ben-Boulaid Mostefa avenue	6	3	1	2	5	3	4	4	28	64,15

13- Boudjeriou Messaoud boulevard	1	3	2	3	4	1	4	4	22	27,675
14- Abane Ramdane street	2	2	3	3	4	3	4	4	25	48,425
15- Belouizdad boulevard	2	3	3	3	4	1	3	4	23	21,45
16- Independence boulevard	1	3	3	3	4	3	4	4	25	11,725
The average	1.53	2.82	2.76	2.47	2.82	2.65	3.47	2.94	21.47	22.89

Source: Authors

Accessibility

Accessibility depends on many personal factors, but also on the design and layout of the space (Chettah, 2021). The large flow of pedestrians in public spaces and the presence of vendors' stalls paralyse traffic. In addition, the quality of the roadway and the choice of materials pose problems. As in all historic cities, the narrowness of the streets and the mixed use of pedestrian and mechanical traffic in the old town do not facilitate walking, particularly for people with reduced mobility. In Constantine, and even more in the city centre, this category of population is not welcome and encounters many difficulties. For example: the uneven terrain and the presence of stairs and no lift in several streets of the Medina are constraints; the mixed use of mechanical and pedestrian traffic and the narrowness of the streets do not make life easier for this category of people. In terms of public space, there is a lack of appropriate facilities and, sometimes, the non-existence of these facilities poses problems of accessibility to services and equipment.



Figure 6. Pavement and degraded condition of pavements. Source: Authors, 2021.

Connectivity

The connectivity of the network is a key element in facilitating the pedestrian's journey and enabling him to go directly to his destination, thanks to continuous links. However, the connectivity of the city centre to the rest of the city is strong, particularly in recent years when it has been greatly improved by the tramway project. This non-polluting mode of transport links the city centre to the new town (Ali Mendjeli) and ensures fast and ecological movement for pedestrians.



Figure 7. Multi-storey car park in Constantine (Source: http://www.bazoga.over-blog.com)

In spite of the tramway being in operation since July 2013, an indicator of good management of public transport, the city centre still has a major traffic problem. It is poorly served in terms of public transport, especially in the old town, where without taxis that accept to go inside, there is no other way to access it. Even the practice of these taxis is also the cause of traffic disruption. It increases traffic jams and further complicates the situation. The city centre of Constantine suffers from the lack of regulatory parking spaces, except for certain administrations, while other users opt for anarchic parking. Despite the 500 spaces offered by the new multi-storey car park, old habits and its location on the side of the ravine near the Sidi Rached bridge and the Mellah Slimane footbridge force users to walk to reach the centre, especially in cold and rainy weather. According to the PPSMVSS study, the old town has 400 public parking spaces in addition to private spaces reserved for administrations.

Building Density

The very high density of our case study, with small urban blocks allowing all services to be reached within a 5-minute walk. This explains the high pedestrian flow in the city centre. The use of the car is not necessary for travel, especially within the old town (Boukelouha, 2021).

The Mix of Functions

The high functional mix of the city centre of Constantine plays an important role for pedestrian mobility. It is not necessary to travel far to find what you need, thanks to the many activities at the bottom of the buildings. Most of the activities, especially shops, are located in the shops at the foot of the buildings, where there are also liberal activities such as dental, medical and legal offices, etc., and the concentration of most administrative activities and services.

The Human Scale

According to Ewing et al. 2006, the human scale is one of the key points to promote walkability, but we recorded low scores on this criterion. The ratio of street width to building height (H/L ratio) contributes to the impression of human scale, which gives a feeling of discomfort. Thus, the considerable lack of urban furniture (benches, litter bins, fountains or public toilets) in the city centre does not facilitate the practice of walking. Which leads to the appearance of new forms of appropriation of the public space. The lack of benches in the public space, in the traditional streets as well as in the colonial streets, means that a large number of users, especially the elderly, use the base of buildings or the steps of staircases as a place to rest. In this same space, the absence of rubbish bins means that people throw away alcohol bottles (plastic, glass), clothes, electronic devices and other waste. Despite the beauty of the site, the places have become almost inaccessible by the majority of the city's inhabitants (Boukerzaza, 2015)

Framing

According to Reid Ewing and Susan Handy; walking allows for movement on foot in a space that remains at human size where it is possible to move through the body (Miaux, 2009 cited by Mouada, 2020). Regarding the respect of framing in the city centre is good, where strong and almost similar framing scores were recorded, this is due to the colonial and traditional architecture with their different volumes and shapes that are visually defined by horizontal boundaries (buildings), which gives the impression of being in strongly framed interior environments, and allowing to favour walking.

Security

The feeling of Security is essential for the comfort of pedestrians (Chettah, 2021). In the city centre, the safety of pedestrians is exposed to the risk of the car on a daily basis. This problem is linked to the anarchic crossing of the road by pedestrians and the invasion of the public space by over-parked vehicles.







Legibility

Lately, in Constantine, we have noticed a renewal of the urban furniture in almost the whole city (billboards, bus stops, benches, lighting posts,.. etc.). Despite this, the city centre remains one of the least equipped places in this respect, especially in the old town. The colonial and traditional buildings with their different volumes and forms constitute a remarkable marker for the city centre. They constitute in fact a symbol of a good "legibility", they facilitate the identification of the points of reference and calls in the landscape such as the great post office, the regional theatre, the Medersa, the mosques, etc, and make it possible to find one's way around the space.



Figure 9. The Medersa of Constantine. (Source: http://www.vitaminedz.org/la-medersa-de-constantine/ Photos_20376_47960_25_1.html)

The comparison of the results of the average pedestrian flow intensity and the walkability assessment grid (see table 2) shows that (colonial) public spaces with high walkability scores because they have a good quality of the built environment for walking, have low pedestrian flow. While other public spaces either (colonial or traditional) with low walkability scores because they have a poor quality of the built environment for walking, have a high pedestrian flow. This led us to conclude that the built environment, the fundamental element for the good development of walking in the city centre of Constantine, is not the only factor influencing the practice of walking and the difference in the intensity of pedestrian movement is justified by the presence of other factors, which are external to it.

MOTIVES FOR WALKING ACCORDING TO THE 03 SPHERES OF LIFE

To explain the difference in pedestrian flow between the different public spaces in the city centre, we conducted our questionnaire among users of public spaces in the city centre of Constantine. Our sample contained 201 respondents, 102 of whom were men and 99 women. Figure 10 illustrates the percentage of reasons for walking in the city centre of Constantine according to the three spheres of life. It can be seen that the "purchase" motive is the main and dominant one with 49.90%, followed by the "work" motive with 27.86%, and finally the "study" motive with 17.91%. This is justified by the attractiveness of the city centre through the concentration of most commercial, administrative and service activities. According to the interviewees, a number of factors influence the choice and practice of walking in the city centre of Constantine:

-The uneven terrain is the first factor that sometimes makes a trip on foot easier than a long diversions by car.

-The lack of parking spaces in the city centre forces users to park elsewhere.

-The lack of transport capacity on the one hand, and the lack of access to popular areas on the other hand, have made it difficult to use.

-The centrality and attractiveness of the city centre due to the concentration of most commercial and administrative activities and services on its site.

- Age: the youngest and oldest people walk more than the others (Chettah and Messaci, 2014).

-The practice of walking is closely linked to income, the higher the income, the less walking is practiced.

-Inhabitants of the centre walk more than foreign inhabitants.

-Gender is a highly discriminating factor in the use of walking, especially for shopping, where women are more numerous than men (see figure 10).



Figure 10. Reasons for walking in the city centre of Constantine according to the three spheres of life (Source: Authors)

CONCLUSION

This work has enabled us to reveal the difficulty of walking in the city center of Constantine. The city center is still suffocating under the weight of intense automobile and pedestrian traffic, which completely congests its urban space. In the city centre of Constantine, walkability is not limited to the built environment, which is a fundamental element for the good progress of walking. In fact, the combination of many external factors has an influence on the choice of pedestrians' movements: such as the motives for travelling, place of residence, etc. Because walking is performed, considered and perceived differently by different pedestrians, and each pedestrian is different and has his or her own type of walking. There is therefore a multiplicity of ways of walking in urban public space and a singularity of ways of walking (Thomas, 2005). Walking as the primary mode of travel in the city, does not constitute a major objective within the planning logic and is even neglected. It occupies a minimal place in the concerns of planners and political actors, whose concerns lie more in the management of the automobile. It is indeed necessary to take the issue of walking fully into account in the projects and debates on the problems of congestion in the city, in order to reduce the use of cars, particularly in the old town. In order to return public space to pedestrians, it is imperative to:

- > Limit all mechanical traffic in and around the Medina,
- > Reduce the surface area dedicated to car traffic and anarchic parking,
- Offer adequate parking spaces and set up an efficient public transport network, by offering pedestrian facilities accessible to all, and by encouraging the practice of walking as a mode of soft mobility
- Raise awareness of people who do not walk or do so infrequently, and by convincing them of the benefits of this mode of travel.

REFERENCES

- 1. Aichour B. (2008) : « Le problème de l'embouteillage du trafic urbain et son impact sur la ville de Constantine «.Doctorat d'État En Urbanisme. Faculté des sciences de la terre, de la géographie et de l'aménagement du territoire. Université Mentouri Constantine.
- 2. Antonin Margier, 2009 : « la condition piétonne au Caire: révélateurs d'inégalités socio-environnementales », doctorant en urbanisme (UQAM Montréal).
- 3. Benidir F, 2007 : « *Urbanisme et planification urbaine. Le cas de Constantine »*, Thèse de doctorat, université de Constantine.
- 4. Boukelouha Radhwane ,2021 : « La performance morphologique des tissus urbains à l'égard de la marchabilité en Algérie. Cas des villes Ali Mendjeli et Constantine. », thèse de doctorat, faculté d'architecture et d'urbanisme, Constantine 3.
- 5. Centre de recherches routières : Méthodes de comptages piétons dans l'espace public : Etat de l'art sur les mesures existantes pour la réalisation de comptages et d'observation des déplacements piétons en milieu urbain Service public régional de Bruxelles, Bruxelles Mobilité, Direction Stratégie.68p.

- 6. Chettah S and Messaci N, 2014. La mobilité urbaine a El khroub, entre pratiques et aspirations des citadins, sciences et technologies, N° 40, pp.83-92
- 7. Chettah S, 2021 : « La requalification de la ville par l'écomobilité, cas de la ville d'El khroub », PhD thesis in urbanism ; faculty of architecture and urbanism, Salah Boubnider University Constantine 3, Algeria.
- 8. Clara, N° 1, avril 2013 : « Marche et espace urbain de l'Antiquité à nos jours ».
- 9. Comptage piétonnier dans le centre-ville de limoges, du10 au 15 octobre 2011,66p.
- 10. Dounia Laouar, Said Mazouz et Jacques Teller, 2019 : « L'accessibilité spatiale comme indice de fragmentation urbaine dans les villes coloniales. Le cas de la ville d'Annaba », *Cybergeo : EuropeanJournal of Geography* [En ligne], Aménagement, Urbanisme, document 884, mis en ligne le 22 janvier 2019, consulté le 28 janvier 2019.
- 11. Elodie AVEROUS, Février 2010: Flux piétons du centre-ville de Montpellier Enquête 2009,
- 12. Direction Etudes & Observatoire Economique, Chambre de Commerce et d'Industrie de Montpellier, 77p.
- 13. Fezzai Soufiane,2018 :« La configuration urbaine comme outil d'orientation des comportements : Cas d'étude des transformations urbaines dans la vieille ville de Constantine »,Doctorat en sciences en Architecture, Université Mohamed Khider Biskra
- 14. Florine Bastin ,2014 : « Marcher en ville, percevoir et évaluer les ambiances.
- 15. Florine BASTIN ,2014 : « Marcher en ville, percevoir et évaluer les ambiances.
- 16. HAMOUDA Hanane, 2018 : la marchabilite a Constantine : Entre le facteur environnement construit et la pratique de la marche (cas du centre-ville), Sciences & Technologie D– N°48, Décembre 2018.
- 17. Hélène HOUOT, (2004) : « Les déplacements pédestres à Besançon », ThéMA, CNRS-UMR 6049, Université de Franche-Comté.
- 18. Julie Roussel. 2016 : « Le confort de la marche dans l'espace public parisien : représentations, pratiques, Enjeux ». Géographie. Université Paris-Est, Français.302 pages.
- 19. Khenoucha Taieb, (2011) : « L'espace public, entre vocation publique et sensibilité de l'espace : Cas de Constantine), Doctorat d'État En Urbanisme. Faculté des sciences de la terre, de la géographie et de l'aménagement du territoire. Université Mentouri Constantine.
- 20. Lucile Develey, 2012 :« Si on marchait a Morgarten, étude de la marchabilité et des facteurs incitant à la marche dans un quartier chaux de fonnier », Université de Lausanne.
- 21. Marine VEVER, 2012 : « Comprendre la sociabilité des espaces publics à travers leur potentiel piétonnier : Le cas de quatre voisinages à Montréal », Mémoire de Maitrise ès. Sciences Université du Québec.
- 22. Mehdi Boukerzaza ,2015 : « La revalorisation du patrimoine bâti par l'espace public : les cas de la Vieille Ville de Constantine (Algérie) et l'Ecoquartier de Vauban à Fribourg-en-Brisgau (Allemagne) » Géographie. Université Jean Monnet Saint-Etienne.
- 23. MOUADA Nassima, 2020 : « Etude de l'impact de la morphologie urbaine sur le confort thermique et la marchabilité dans les espaces publics extérieurs .Cas de la ville de Sidi Okba », thèse de doctorat en Architecture, Université Mohamed Khider-Biskra.
- 24. Peponis J., Wineman J., Bafna., S., Rashid M., Kim S.- H., 1998, « On the generation of linear representations of spatial configuration *»*, *Environment and Planning B : Planning and design*, Vol. 25, n°4, pp. 559-576.
- 25. Rachel Thomas, 2010 : « Marcher en ville :faire corps, prendre corps, donner corps aux ambiances urbaines », éditions des archives contemporaines,171p.
- 26. RAHMANI Amira, 2012 : « la perception sensorielle dans les espaces urbains mouvement et choix d'itinéraires pédestres dans les espaces urbains de Sétif : Cas du centre ville de Sétif », Mémoire de Magistère, Université Mohamed Khider Biskra, 294 pages.

- 27. Saadi Ahmed, 2005, « Le problème de la circulation et du stationnement dans le centre ville de Constantine » *mémoirepour l'obtention du diplôme magister*, Faculté des sciences de la terre, de la géographie et de l'aménagement du territoire. Université Mentouri Constantine, 159 pages.
- 28. THIBAUD Jean-Paul, 2010 : « Des modes d'existence de la marche urbaine», dans Marcher en ville. Faire corps, prendre corps, donner corps aux ambiances urbaines », Archives contemporaines, France.

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