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## **ASSESSMENT OF WALKABILITY IN THE CITY CENTRE OF M'SILA USING A QUALITATIVE BAROMETER**

**Abstract:** In recent years, much attention has been drawn to the walkability, it is regarded as an important urban capability that needs to be achieved and enhanced, as the urban environment can either permit or hinder the propensity to walk. This paper aims to explain the spatial relations that describe the elements of urban design for a walkable urban environment; we also attempt to measure and specialize in public pedestrian spaces using a qualitative barometer (in the city centre of M'sila that becomes a commercial attraction). This barometer shows how urban design can be used as a way to create functional city centre, it also analyses the conditions under which the city centre offers an adequate and favourable environment for walking. Although the city centre of M'sila provides many positive things like diverse shopping places and a variety of functions other than shopping. However, it requires continuous development to urban design to meet the new social requirements. The pedestrian encounters many obstacles and difficulties in moving and accessing public spaces, especially during peak hours and holidays, which has prompted us to draw particular attention to further analysis of different elements of the layout.

**Key words:** evaluating the walkability, pedestrian accessibility, city centre, M'sila, public space, urban planning

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## Introduction

In the 1980s, in the context of sustainable development, the importance of walking in the city had been spotlighted, especially for revitalizing the city centre. Walking continues to be the most common mode of travel, according to the WHO, almost half of all road deaths in the world affect the least protected users: pedestrians (22%) ranked second after cyclists (Bertoncello et al., 2017).

Walkability is a recent concept (Blečić et al. 2015; Blečić et al. 2020) which emerged at the turn of the 2000s which is part of both the context of Sustainable Development and energy transition (to prepare for the post-carbon era), and public health in support of the fight against obesity and chronic sedentary or the promotion of active aging.

This concept also represents one of the links between urban planning and health, as Glicksman points out: “this term is often used to identify and measure the characteristics of the built environment that favours or impedes the will and ability of an individual to walk towards local amenities, in particular amenities that are supposed to encourage healthy lifestyles” (Raulin et al., 2016).

The consideration of pedestrians in the city centre raises several issues of safety, environment and quality of life, appropriation of the street and infrastructure. Reflection on these issues helps to clarify the issues and the priority objectives for urban development in a sustainable development approach, promoting marketability in the city centre. The city centre being a place of diversity by nature, it allows exchanges and contact of people with each other, a source of dynamism and progress. Every city resident is part of this place and must be able to benefit from an overall perception of this diversity and a power equals to that of his fellow citizens.

The town of M’sila has experienced a similar phenomenon in road accidents, especially in the city centre. According to statistics collected at the level of the wilaya’s civil protection directorate, the city has witnessed a significant increase in the number of traffic accidents in recent years. Even though most of them are not reported, according to the results of the interventions of the civil protection units, during the period from January to September 2018, 163 accidents were recorded. This is primarily due to the quality of the facilities which do not allow pedestrians to move around safely: damage and occupation of sidewalks, presence of obstacles, and absence of pedestrian crossings pushing pedestrians into the mechanical lane.

The city centre of M’sila is a privileged destination and a commercial centre that includes a high proportion of shops. By diversifying its offer, it attracts its population and those of the peripheries and becomes an important attraction. Many phenomena were observed in city centre of M’sila, like the occupation of the sidewalks, the messy parking, inadequate facilities for pedestrians and especially for people with reduced mobility.

The pedestrian area in the centre of M’sila encounters different conflicts of practice, especially during the weekly rest days such as Saturday when the deviant and unplanned use, the appropriation of sidewalks by certain traders who hinder the passage of pedestrians. In this context, it is more interesting to ask: What is the role of pedestrians in the design and development of public spaces in downtown M’sila? This study is based on the hypothesis that the quality of pedestrian space in the downtown area influences walking.

## **Study Background**

Walkability is the ability of the built environment to encourage individuals to walk (Fancello et al., 2020). We claim it is a composite quality of urban space produced by the combination of several spatial factors related to the organization and functionality of cities (Fancello et al., 2020). In several countries around the world, walking is privileged by developing a network of pedestrian streets, especially in the city centre, and by also creating pleasant and safe traffic for walkers, such as urban routes (Basbas et al., 2020). As part of a policy to improve the quality of life in residential areas, there are “urban courtyards”, “traditional landscaped streets” to reduce traffic. These measures are taken to: eliminate transit traffic, give priority to pedestrians and require drivers to drive at 20 km/h or 30 km/h, secure children’s games, limit parking, etc.

The vitality of the city centre is closely linked to economic activity and the pedestrian occupation of the space for various reasons. The pedestrian is synonymous with a guest in the city centre. In addition to travel for goods and services, these activities in urban areas are collectively referred to as “pedestrian presence” or “residence function”. Walking is a means of travel, physical and sensory experience is a vehicle for exchanges in the city, pedestrian presence is at the heart of the city’s life, contributing to the existence of comfortable, attractive, prosperous and sustainable cities without pedestrian routes, no commercial vitality (Fleury & Mathian, 2012; Michaud, 2008).

The city centre is a place for strategic reflection to operate on a scale larger than the perimeter of the city. It is necessary as a locomotive for the city. The main challenge of the city centre is the influence, efficiency and fluidity that can be achieved by roads, pedestrian streets, parking areas, expanded sidewalks, delivery spaces, bus stops.

## **Approach and Methodology**

In order to understand and respond to the challenges posed by the study of pedestrian space in the city centre, we have adopted in this study an analytical methodology based on a pedestrian-by-flow approach, rather than on practice, which is to define the links between the number of pedestrians and the elements of the layout. In addition, this work goes beyond analysing pedestrian behaviours and practices based on discrete observations of journeys and pedestrian interviews with the objective of bringing out the factors that influence its decision-making and behaviour. This study is part of a broad reflection on the pedestrian space in the city centre. In order to understand this phenomenon, we have adopted in this study an analysis methodology based on sequential analysis that allows us to study changes in the visual field of a route (Panerai et al., 1999) by considering the pedestrian as an observer.

The qualitative evaluation is based mainly on the notion of landscape which is social and natural, subjective and objective, material and cultural production, real and symbolic. The landscape is thus located at the hinge between an object: space, place, and a subject, the observer, in this case the pedestrian.

The sequential analysis (Owen, 2019) is based mainly on the notion of landscape which is both social and natural, subjective and objective, material and cultural production, real and symbolic. The landscape is thus located at the hinge between an object: space, place, and a subject, the observer, in this case the pedestrian.

This sequential analysis is seen as a tool for analysing the relationships between pedestrians and their environment. The aim is to capture the pedestrian environment within its parameters that influence the sensory perception of pedestrians. Within this framework, an analysis grid is constructed.

We also chose to observe the public pedestrian spaces through a well-delimited space: the city centre. As part of this research, we define the pedestrian space as a well-designed place that ensures pedestrians safe, efficient and comfortable travel (sidewalk and pedestrian crossings).

The observation technique has been used as a data collection tool where several direct observations are taken in the field in order to obtain objective information that can be categorized and statistically analysed. Then, in addition to our observations, photographs are taken for several days, including Saturday (weekend day). Downtown attendance increased on Saturdays or rush hours before 11.30 a.m., showing the impact of morning hurry. These photographs are used to gain a better understanding of the experience.

The first step in this work is the choice of a route to be analysed, the criteria for choice are: attendance, concentration of businesses and accessibility. The second step is to divide the course of the studied space into four numbered sequences from 1 to 4 by following the intersections along the course. The third step is the construction of a design element analysis grid.

### **The Concentration of Equipment: A Parameter that Determines the City Centre**

Due to its strategic position in the city of M'sila, the city centre is an attraction; it gives dynamism and commercial vitality in the city of M'sila. It is the hub of several transit systems on Line 01, Line 03, Line 04, Line 05 and Line 20, so it is the best-served transit system in the entire metropolitan area.

Historically, the city centre was the "heart" of the city. It concentrated the main activities, events, meetings, exchanges and economic profitability. Today, the notion of the city centre has moved away from these representations; building on the determination of M'sila's city centre on several indicators: morphological centrality, commercial and functional density and diversity.



*Fig. 1. The city centre*

The shopping centre of the city is located in the city centre close to the highway 60, the commercial function is the fundamental urban function in this centre. The city centre had 564 shops. The use for commercial reasons generates large flows and new movements in the city centre that reinforce its attractiveness and vitality. It has a high population and commercial density (Table 1, Table 2).

*Tab. 1. Downtown data*

Total surfaces	28 ha	100%
Built surface	14.26	50,94
Inbuilt surface	13.74	49.06%
Number of population	3094	-
Number of commercial stores	564	-

*Tab. 2. Distribution of commercial stores*

Commerce net	450
Commerce of service	88
Artisanat	26

The city centre has an intense pedestrian and automobile flow, especially during peak hours (Table 3).

Tab. 3. Pedestrian and mechanical flow

Nature of flow	Flow
Mechanical flow	6702 UVP
Pedestrian flow	16859

## Diagnostic Elements of Pedestrian Spaces

The system of indicators must meet several objectives that allow a better understanding of the need to take real account of the pedestrian area in the city centre. The indicators provide valuable information and benchmarks for local actors and residents, and also provide methodological tools in an analytical approach to post-assessment.

The comfort and quality of the pedestrian route are criteria for the success of a policy of revitalization of the city centre. The diagnosis used is articulated on 2 main axes and each axis builds several themes. For more readability, a list of key indicators is proposed for each axis (Table 4). This qualitative barometer makes it possible to identify the structural, aesthetic and perceptual characteristics of the route studied and to define its dysfunctions.

Tab. 4. Analytical grid (qualitative barometer)

Formal characteristics	Theme	Indicators	The diversity of functions
<b>Materials</b>	<b>Structure</b>	Accessibility	Indicate the functional nature of the soil the user borrows. The shapes and lines drawn by these materials participate in: - The identity of the place and its use - Circulate freely - Linearity of the pedestrian corridor.
		Diversity of urban forms (squares, urban parks, gazebos, etc.)	
		Diversity of functions (services, leisure, cultural activities...)	
		Wider pedestrian area	
		Wayward comfort	
	Factory height/sidewalk width ratio		
<b>Materials</b>	Coating	The materials used must be non-slip and uniform, and the joints narrow and shallow; Take counts climate conditions	
<b>Furniture</b>	Functional furniture, Pleasure furniture, Signage furniture		
<b>Symbols</b>	<b>Signal representation</b>	Uniformity Simplicity Legibility	Uniform signage throughout the territory to provide pedestrians, who often pass from one district to another, with a reliable and authoritative reference
	<b>Urban aesthetic</b>	Cleanliness Green Overview	
	<b>Animation</b>	The friendliness of the pedestrian routes	
	<b>Perception</b>	Feeling secure; The security of vulnerable persons; Feeling of well being Smell	

## Sequential analysis

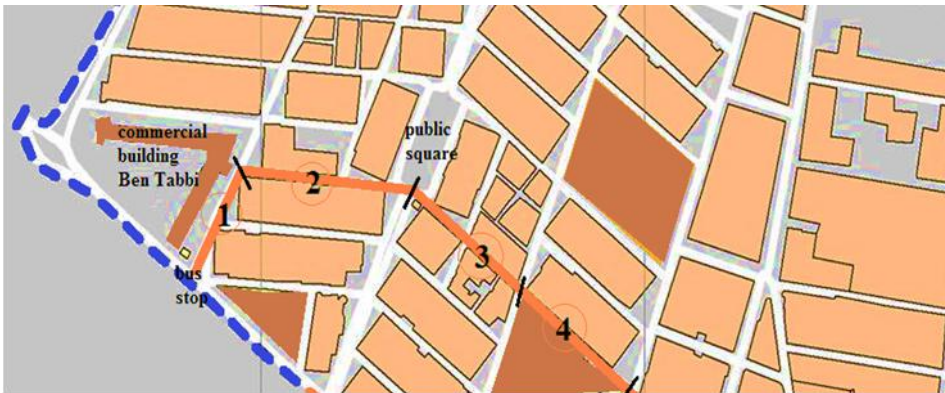
### *Analysis of Components of the Urban Landscape*

The city centre plan is of checkerboard type (Figure 2), the perpendicular lanes generate an open and aerated fabric, in which the streets are rectilinear and intersect at right angles, creating islands of square or rectangular shape and based on geometry as a spatial management tool while pressing on the dimensional/proportional characteristics of the different entities. This frame is adapted to the requirements of functionality (mechanical access, fluidity and flow of pedestrians).

### *Sequence Analysis*

The route studied is a penetrating route of about one kilometre, it connects the bus stop through the city centre, this route receives a dense and continuous traffic, which is explained by the concentration of commercial and service premises, constituting a destination in itself and a crossing point connecting various attractions.

Our analysis is based primarily on the breakdown of the route studied into 4 sequences, according to several criteria. There are 3 types of lanes in order of importance: primary (sequence 1) secondary (sequences 2 and 3) and tertiary (sequence 4).



*Fig. 2. Sequences studied*

## Results and Discussion

The analysis of the various indicators shows the following:

- J The first sequence presents the main access of cars and pedestrians to the city centre; it poses the questions of visibility and signage.
- J There is a good mix of commerce within the same list of the different sequences studied (service trade, clothing trade for women and children, shoes, accessories, crockery and perfumery), without forgetting the shops along the street (crockery, fruit, shoes, toys, carpets) which creates a variety of use and a more marked dynamic around this street.
- J There is a mix of functions on the 2<sup>nd</sup> sequence as the two-story buildings contain shops on the first floor and housing on the next floors, sometimes these houses are rented for use of offices, medical practice or association.

- J Sidewalks measuring between 1 and 4.3 meters are present on the entire street studied, but are sometimes ill-defined on several sequences (too wide pavement, lack of furniture, etc.), discontinuities and cuts of spaces in which the pedestrian circulates.
- J The obvious lack of pedestrian crossings at or near the crossing is a major risk factor, especially for children and persons with reduced mobility.
- J On Saturdays, shopping trips in the city centre are doubled.
- J Lack of signage and markings in all sequences except for a sense plate prohibited in sequence 3 which is misplaced (in the middle of the street).
- J It can be seen that, despite the daily collection of waste in the centre of M'sila, the continuous presence of waste is found, especially in the sequence 1 and 2, due to the pedestrian and mechanical daytime flow. Saturday is a weekly day of rest, with a flow up to three times the average of the week, this strong commercial flow is generated from waste.
- J The presence of obstacles on the sidewalks, the occupation of the sidewalks by means of cooking equipment for chickens and by the carts of ice-cream merchants and the exhibition of goods outside the shops.
- J The appropriation of public spaces by illegal traders and street vendors. This phenomenon is aggravated during religious holidays: the holy month of Ramadhan, Aid fitr, Moualid Nabaoui and the beginning of the school year, which hinders pedestrian traffic and causes traffic jams.
- J Total exclusion of persons with reduced mobility from the design.

*Tab. 5. Accessibility analysis*

<i>The dimensions of accessibility</i>	<i>Sequence 1</i>	<i>Sequence 2</i>	<i>Sequence 3</i>	<i>Sequence 4</i>
the physical opening of the place to the city	x	x	x	x
Regulation of pedestrian traffic	x		x	x
Principle of organizing modes of co-presence in public	x		x	x
Diversity of modes access to space	x	x	x	
Access to persons with reduced mobility	x		x	



Tab. 6. Types of shops

Type of trade	Sequence 1	Sequence2	Sequence 3	Sequence 4
Trade in women's clothing	8	7	2	8
Children's clothing	3	2	0	2
Jewelry	1	2	2	0
Food trade	0	1	0	0
Perfumery	0	1	0	0
Trade shoes	5	4	2	1
Women accessories shop	1	3	1	0
Luggage store	3	3	1	1
Restore Service	1	2	1	1
Hardware	0	2	0	0
Shop selling veils	3	5	0	2
Knitting	2	4	0	2
Trade in fabric/ coupon / wool	0	2	1	3
Trade in hygiene products	1	2	0	0
The grocery store	1	1	1	1
Tailor / designer;	0	1		
Ice cream counter	1	2	1	0
Pizzeria	1	2	2	0
Pâtisserie	2	1	0	0
Cosmetic Store	0	3	1	1
Watch Store	0	3	1	0
Tableware Store	5	6	2	0

The analysis of the above criteria highlights the classification according to approach for assessment: adapted, medium and mediocre (Maitre & Millot, 2013). For us, the quality is adapted when the sequence is accessible, diversified, attractive to pedestrians, also when the urban furniture on the sidewalk, the location of trees and the width of the corridor walks allow users to move in a simple and safe way.

Tab. 7. Summary of results (G: Good, S: Suitable, W: Weak)

Themes	The Planning Elements	Sequence 1			Sequence 2			Sequence 3			Sequence 4		
		G	S	W	G	S	W	G	S	W	G	S	W
The structure	Accessibility	x				x		x				x	
	diversity of urban forms		x		x			x			x		
	variety of functions			x			x		x			x	
	Wider pedestrian area		x				x		x				x
	Wayward comfort			x		x			x			x	
Materials	Coating		x			x		x				x	
	Urban Furniture												
Urban aesthetic	functional furniture			x			x				x		x
	pleasure furniture			x			x				x		x
	signage furniture			x			x				x		x
Animation	Cleanliness			x			x		x			x	
	Green Overview			x			x				x		x
Perception	conviviality			x			x		x			x	
Perception	feeling secure		x			x					x	x	
	the security of vulnerable persons			x			x				x		x
	Wellness Sense			x			x		x			x	
	Smell			x			x		x			x	
<i>Routing quality</i>		weak			Suitable			weak			suitable		

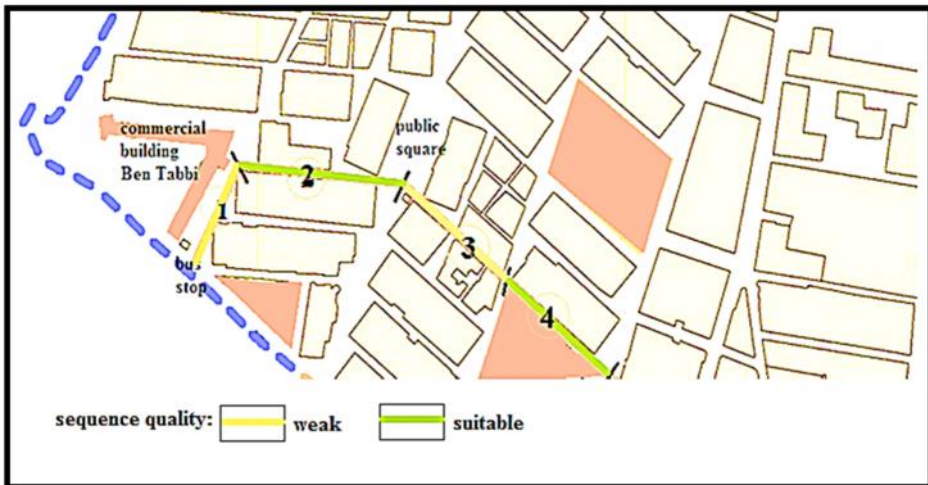


Fig. 3. Quality of the Ben Tabi route

## Conclusion

Walking, according to sustainable development, helps to be healthy and preserves the environment. It is, therefore, necessary to achieve the integration of the pedestrian into the public space as a perpetual and occupying movement of the pedestrian, but also to adopt a

comprehensive approach that takes into account the pedestrian and his needs in the development operations.

This work focused on the question of the quality of pedestrian spaces that must be offered by the downtown, ensuring, an active and lively movement for pedestrians. It emphasizes the importance of adapting the city centre to pedestrians.

The city centre has become over time a commercial centre for the town of M'sila, the presence of other service activities brings a crowd, so it becomes a commercial centre frequented by both the inhabitants of the town and the suburbs.

After analysing the downtown area, it was found that pedestrians are subject to several obstacles generated by inappropriate sidewalk and pedestrian path layouts and discontinuities in the paths that do not guarantee the legibility and attractiveness of these spaces by making walking difficult. Pedestrian areas do not have all the characteristics that a dynamic place like the city centre should have. The presence of a single type of pedestrian space, which is the sidewalk.

Conflicts of Interest: The authors declare no conflict of interest.

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