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Approach for Designing and Evaluating Pedestrian Districts, Case Study Zamalek District

Nisreen Samy Abdeen

Assistant Professor in Architecture Department, CIC Canadian international college
Nisreen_s_abdeen@CIC-cairo.com

ABSTRACT

Creating a healthy environment is a great challenge, as most of nation streets turn to be highways instead of being streets. The main reasons for the research are to save the culture view, with its walkable network, to overcome the lack of regulation for walkability, according to the Cabinet of ministers, 2020. The paper consists of three sectors, first the theoretical approach that identifies the walkability features. Second, the urban field literature, which is based on a questionnaire to assess the walkability percentage in streets, and citizen's comfort, then the finally third sector suggest a walkability application as a guideline to respond to the public opinion evaluation. The Study context is based on assessing the amenities provided for Walkability within its urban context. The research focused on the walkable districts that have good culture view to be a sustainable landmark for cities, to increase tourism, to avoid the "upward mobility", and satellite desert city for new development. Hence the deductive approach is based on a theoretical comparative analysis within creating application, to show the relationship between the walkability indicators for the citizen, in questionnaire using Essen's walkability assessment. The central problem of my study is how to revive our nation's streets into sustainable routes. The main conclusion is to achieve adequate urban design for citizen, depends upon their exact needs, based on climate, gender, and age that will vary from region to another, this was achieved by concluded different walkability indicators which were mentioned at the end of this paper.

KEYWORDS

Sustainable Urban, nation streets, districts, Streetscape, walkability.

منهاج تصميم وتقييم مناطق المشاة، دراسة حالة منطقة الزمالك

الملخص

يعد إنشاء بيئة صحية مستدامة للطرق تحديًا كبيرً، حيث تحولت معظم شوارع القاهرة إلى طرق سريعة للسيارات بدلاً من أن تكون شوارع جانبية تسمح بمرور المشاة. تتمثل الأسباب الرئيسية لهذا البحث في الحفاظ على الهوية الثقافية للمنطقة محل الدراسة الخاصة بمسارات المشاة، وذلك للتغلب على القوانين الغير وافية لهيئة الطرق والخاصة بالمشاة من خلال إيجاد عملية تصميم شوارع ملائمة وفقًا لقرارت مجلس الوزراء منذ عام ٢٠٢٠. يتكون هذا البحث من ثلاثة اجزاء، الجزء الاول النهج النظري والذي يحدد مميزات وعناصر الطرق المخصصة للمشاة. الجزء الثاني هو الدراسات الميدانية السابقة في مجال التخطيط العمراني والتي اعتمدت على مجموعة من الاستبيانات لقياس النسب المخصصة للمشاة في الطرق محل الدراسة وكذلك مدي ملائمتها للمواطنين، الجزء الثالث يشمل التوصيات الحاصة بمسارات المشاة اعتمادا علي تحليل ارائهم. الدراسة اعتمدت علي توفير التسهيلات الخاصة بمسارات المشاة وتطبيقها لتتلائم مع السياق المعماري لمنطقة الدراسة بالزمالك. البحث قام بالتركيز علي منطقة الزمالك والتي تتميز بطابع ثقافي مميز لتكون نموذج يحتذي به عند تخطيط المدن وذلك لزيادة السياحة والتي تفضل المسارات المخصصة للمشاة وقد نتج عن هذه الدراسة والتي اعتمدت

علي مفارنة الطرق المختلفة للتخطيط العمراني لمسارات المشاة وبيان المؤشرات الخاصة بقدرة المواطنين علي استعمال هذه المسارات من خلال استبيانات استعمال طريقة ايسن لتقييمها والناتج الاساسي لهذه الدراسة هو كيفية تحويل طرق المدن الداخلية الي مسارات صالحة للمشاة والاستنتاج النهائي لهذا البحث هو تجقيق تخطيط عمراني مستدام ملائم لمسارات المشاة و الذي يختلف باختلاف المناخ والنوع والسن وقد تم هذا عن طريق التوصل لمجموعة من المؤشرات الخاصة بهذه المسارات في نهاية هذا البحث.

الكلمات الدالة

تخطيط معماري مستدام، مسارات المشاة، احياء، واجهات الشوارع، شبكات الطرق.

INTRODUCTION

The study methodology is in investigating walkability in nation's streets aspects comparatively in Zamalek as a sustainable mode of transportation; based on ELTIS, Europe's portal for local transportation as shown in Fig (1). The study chooses Zamalek district as the main Nile frontage for pedestrian users. Rapid Urbanization plays a great role in forming environmental districts, resulting in urban sprawl. The paper suggested hierarchy in walking routes standards for future generations that covers the targeted land use and future population needs in nation streets, relevant to the physical international walkability guidelines. The goals of my study are to find walkable cities, by designing a framework for street design process in Egypt, in a sustainable way, where it can shape our cities in a better way. The study suggests several solutions on different nodes where it can transform it into liveable walkable places, rather than being just a landmark. So, we define the obstacles in pedestrian routes in a way finding solutions that increase safety, comfort, and correlation between the feeling of belonging and the built environment. The research highlights on the connection to the community, shown in indicators regarding the social benefit, (economic urban regeneration), environmental (ecosystem services, liveability), political benefits (planning opportunities and sustainable development). Pedestrian inaccessibility affects the city infrastructure, and tourism. The research goal is to implement Walkability in public spaces and shorten distances between destinations (Aerni, 2016). The field case study is based on the physical aspect of the street design process for the efficiency of a walkability enhancement in the conventional urban streets. The study focused on understanding the real needs of people as link between human perception (Je, Lim, Moon, Teng, Brooks, Lopes, & Bianchi, 2021), and physical aspect as shown in Fig (1).

So the research questions are showing the society needs and how to apply it, as shown, What is the main physical aspect of the street design affecting walkability?, What are the main needs of the users of walkable street design?, Which of the walkability indicators affects built environment overall in an indirect or direct way ?, How to assess the street indicators affecting the walkability needs through field measurements ?, How can the framework methodology assess the current situation of the case study and the suggested solutions?, What are the proposed solutions for the sustainable walkable street design?, What is the difference between the research output in the process efficiency and the conventional street design ? (Hsieh & Chuang, 2021). The study focused on designing walkability framework, coping with the surrounding built environment aspects as a microclimate (Tarek, Hassan, Elshater, & Elfayoumi, 2021).

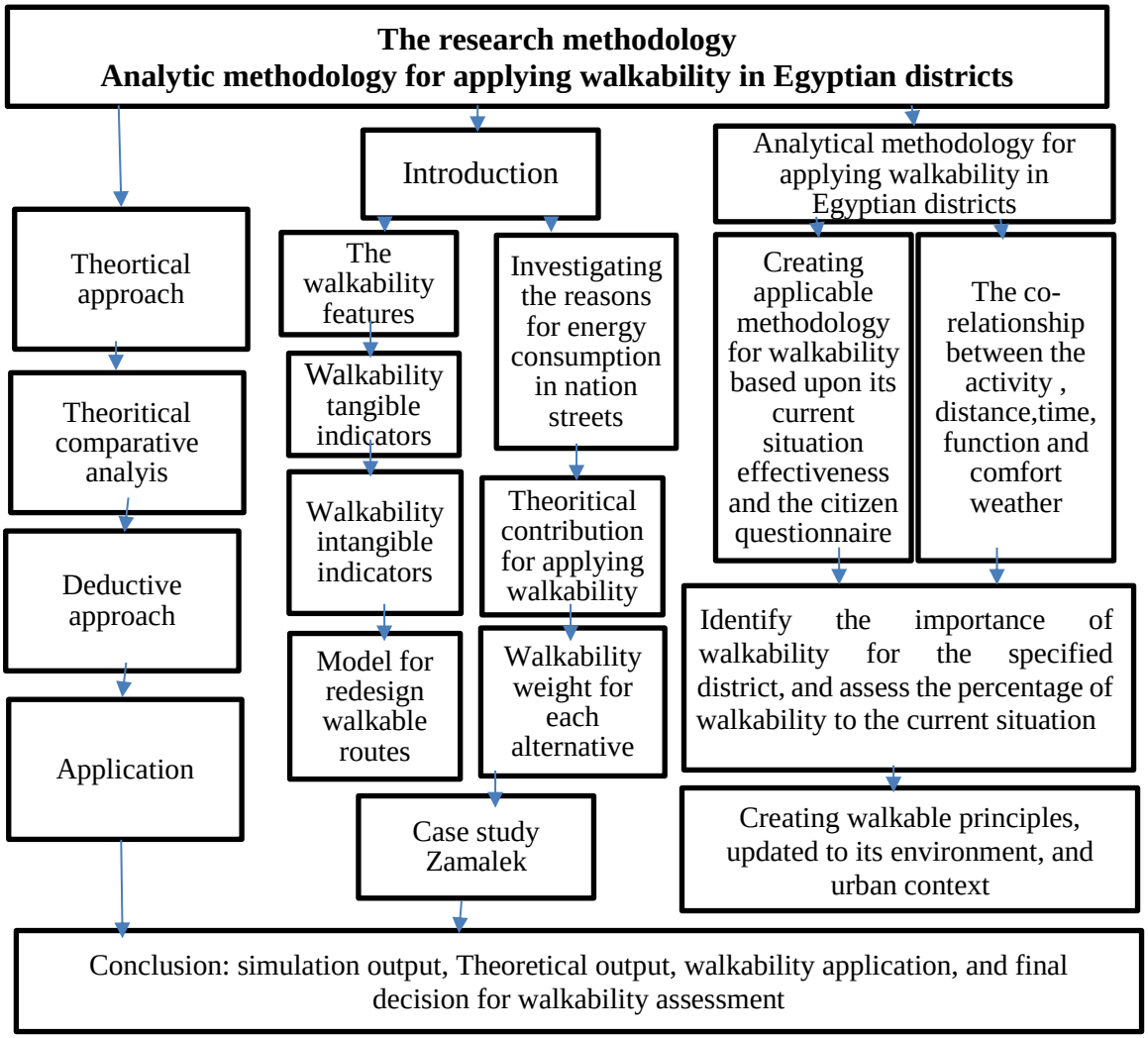

Figure (1) shows the analytical methodology for walkability, subdivided into four main sectors theoretical approach, theoretical comparative analysis, deductive approach and finally the walkability application, Source the author.

This research articulates the relationship between walkability and the urban environment as urban planning for sustainable transportation to a smaller scale in districts, and main nodes, towards purification of pure air in outdoor by decreasing vehicular use (Ewing and Cevero, 2010), conducted relationships between travel modes and the urban environment in an analytic way. The study used different indicators for measuring the walkability variables in built environment, which are street connectivity destination accessibility, diversity, design, density, and land use mix. Many studies didn't mention the assessment framework of walkability as shown in Fig (1), nor the scale of sustainability in built environment and its relationship with walkability (Cerin, Conway, Barnett, Smith, Veitch, Cain, Salonna, Reis, Molina, Hinckson, ,Muda & Sallis, 2019), they just focus on the accurate results in design applications that is convenient to the user (Weinberg & Sweet, 2012).However, many Studies conducted walkability as health studies, and creating framework for specified case studies, like increasing the green areas, availability of street connectivity, while fewer studies tackled the street scale, and human scale, within providing healthy outdoor environment (Bereitschaft , 2018). The common issue in all studies that

walkability is affected by noise pollution in the built environment, upon their point of view, and upon macro scale (Cerin, Conway, Barnett, Smith, Veitch, Cain, Salonna, Reis, Molina, Hinckson, Muda, & Sallis, 2019). Furthermore, many studies previously focused on average walking distances to amenities, partially and its gross quality regarding the district density without showing how these indicators affect the pedestrian real needs, even micro scale (Walk Score Methodology). Urban designers clarify that multi-level notion, cannot be designed in certain parameters, as it is upon the nature of the built environment, the higher-level of street qualities that are more convenient for walkability. Urbanism focus on the relationship between walkability needs and active living, by using walk score scoring, according to the street address to the amenities needed (Río Arce, 2020).

Lots of research had focused on news model as an evolution tool for walkability assessment for an existing situation, from the pedestrian point of view, but can't be used in developing of urban space (Alfonzo, 2005). The walkability in Egypt is constructed by applying framework of (Ewing, & Handy, 2009), by applying re-modifications in walkability indicators, such as the noise indicator, relative to the weighting factor, as (Ewing, & Handy, 2009). The research highlights on the perceptual framework between built environment and user needs, through qualitative data methods (Kerr, et al, 2016), by assessing the specified case study in design, and create an effective way for walkability (Cerin, Conway, Barnett, Smith, Veitch, Cain, & Sallis, 2019). The research is essential for field practice, upon the scale, context, and suggesting different proposals as an objective solution or field application for walkability enhancement in Egypt. Walkability needs are more important in street design. The feasibility of walkability is essential, according to its destination and its accessibility as a walking distance to public transportation. The environmental aspects affect the walkability in a direct way, related to the percentage of green areas per person, and percentage of pollution as (indicators) to be measured and has its rating rate dimension (Mohanty, Chani, & Mohanta, 2021), then collected into one index for the country (Weinberger, & Sweet, 2012). As per Jan Gehl's studies in Life Between Buildings, urban design in improving pedestrian accessibility by integration, social segregation, and urban context, to be existing, and cope with the presence of major streets (Gehl, 1987). The walkability safety and convenience related to the city's economic prosperity as promoting tourism by increasing and upgrading image. Where in London, they encourage walkability by adding value to private property as (VUR) London transport valuing urban realm (Paul Bedford, City of Toronto Planning Director), by creating public spaces.

Fig (2) shows walkability and its relationship with livability and sustainability (Guillen, 2018).

Urban Density, and Topography plays an important role in designing effective streets as moderate-intensity physical activity regarding land-use services (Forsyth, 2015), as shown in Fig (3) that shows walkability and its relationship with liveability and sustainability, as shown in Fig (2), (Saadallah, 2020). Sustainability and Wellbeing is shown in Human-scale development is applied in practice by (Routledge, Centre for Diet and Activity Study (CEDAR) and the Medical Study Council Epidemiology Unit at the University of Cambridge). The Fact of study finds out that the average pedestrian trip length was 0.53 miles. The increased speed is the main cause for the increase in death for pedestrians, as ten-mile-per-hour increase in speed, for example, if a car going 20 miles per hour, decreases the rescue on pedestrian more than 30mph.

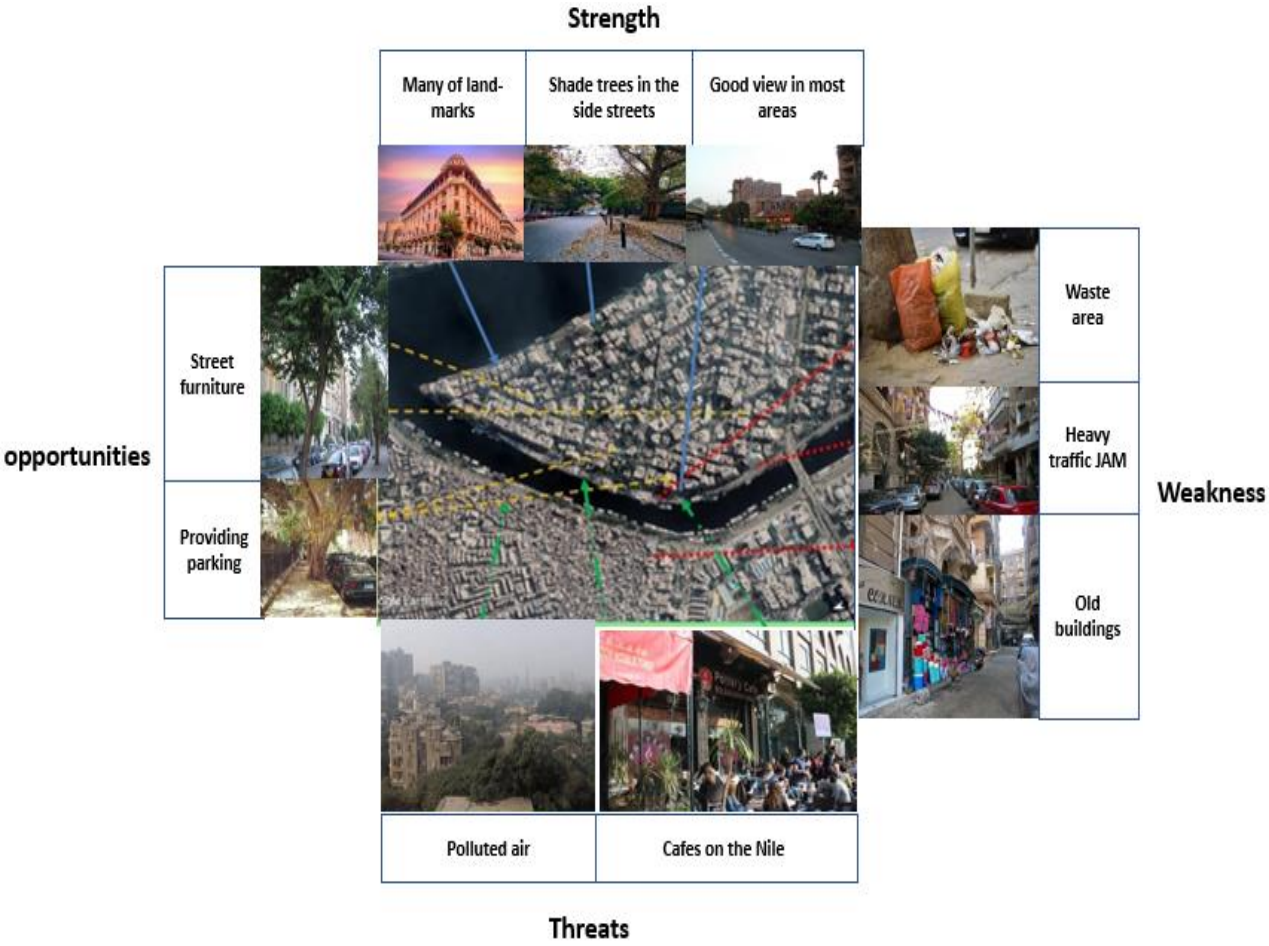

Fig (3) shows S.W.O.T analysis of Zamalek, source the author

Walkability improves social interaction, and economy (El Ghandour, 2017). Study goal is to upgrade walkability in cities in Egypt, as a large-scale district, by applying questionnaire to assess the level of walkability to the central nodes. The study highlighted on a balance ratio between open spaces and urban mass. The paper suggests variable designs for the central nodes, coping with culture identity, within updated street furniture, to be an efficiently walking routes to the points of public transportation, within a reasonable time scale to reduce pedestrian-crossing on the major road in districts.

1. THE ENVIRONMENTAL ASPECTS OF WALKABILITY IN EGYPT

Egypt urban development plan is expanding streets, building bridges, to facilitate vehicle movement, ignoring walkability, beside destroying all the huge boulevards that were giving good aesthetic view and purification in air quality to the streets, building cafes beneath the bridges in the middle of streets.

Fig (4) shows the buffer zone in Zamalek streets, where parking area takes place over the pavements, and pedestrian zone facing discontinuity in walking routes, Source the author.

This critical problem is the cause of turning minor streets into wide speedway, as a "design improvements" for vehicles, neglecting the pedestrian walkways. By surveying and assessing physical indicators affecting walkability (individual reaction, physical features, walking behavior, undersign quality, the legibility, Human scale, Image ability, Linkage, Weather, Comfort Safety, trip goal, population Weather, Street's width, Tree canopy, building height, Sidewalk width, and Traffic volume), the paper find out the weakness, and shortage that can convert it into opportunities, using s.w.o.t analysis, as shown in Fig (4). The frame gap is in investigating the reasons for energy consumption in nation streets, as it is difficult to be accurately measure. The study output identifies the importance of walkability relating to the specified district by questionnaire, to study the co-relationship between features in site as a fact survey to determine walkability in Cairo streets taking Zamalek as case study. Walkability is the best healthy transition without using transportation according to Pedestrians' Quality needs report (Weinberger, & Sweet, 2012).

Fig (5) shows Zamalek Street network, major and minor streets problems, source the author.

Stephen stated that, "Walkability is provided when the public health within the built environmental is secured." There are enjoyable activity elements, and pedestrian facilities needed in each district, that needed to be classified according to community and society needs, such as walking, traffic safety, land use, accessibility, and cycling comfort (Frank, & Engelke, 2005). Walkability is an integrated shared space appealing a simple travel corridor to different places "defined Merriam Webster Learner's Dictionary. While (El Saied, El Gezawi, & El Sayad, 2020) focus more on the built environmental affects the walkability in a direct way. "On the other side (Macdonald, Szibbo, Eisenstein, & Mozingo, 2018), focus on the safety of pedestrians and provide them comfortable environmental. The study case study is Zamalek, and nation districts, where the Data Collection covers the pedestrian data relating to features, links in Nation Street and Constraints to overcome walkability needs and assess it according to the Egyptian context. In Egypt, the contemporary situation, faces an inadequate route as great shortage in sidewalks infra-structure and provided pavements that cause a great gap between pedestrians' networks routes, invasion, and huge congestion in traffic for having more than two lanes, which affects pedestrian safety and traffic jams as shown in Fig (4) & (5). Even in rich districts, there are no safe walkways, as part of it have broken pavements that cause injuries for pedestrian.

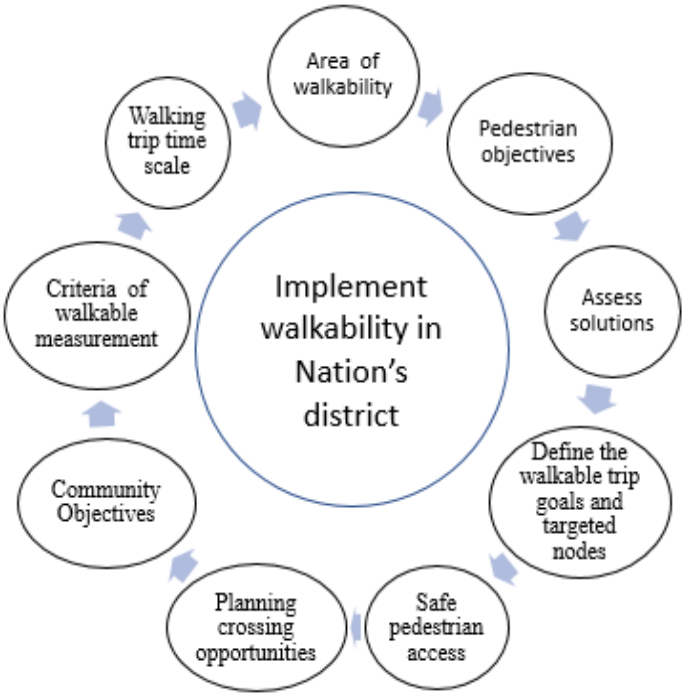

Fig (6) shows the walkability indicators, Source the author

The paper suggested some conceptual Landscape solutions to Zamalek streets, addresses the pedestrian routes value in layout, to integrate public governance in fulfilling citizen needs. To revive the beauty of Cairo, as in the past, by large boulevards. The walkability methodology as shown in Fig (1), where local street characteristics must be divided into three main indicators as shown as in social indicator (such as perceived gathering places, street activities, and safety), physical, and street function, as shown in Fig (6).

1.1. The Pedestrian Quality Needs

It is assessed upon the European cooperation in science and Technology report. the study entails in investigating the walkability percentage, and the needed perceptions in streets for pedestrians, in order government can implement sustainable urban policies, as shown in Fig (7) as the analytical methodology.

Fig (7) shows implementing walkability as a planning process in nation streets, source: the author.

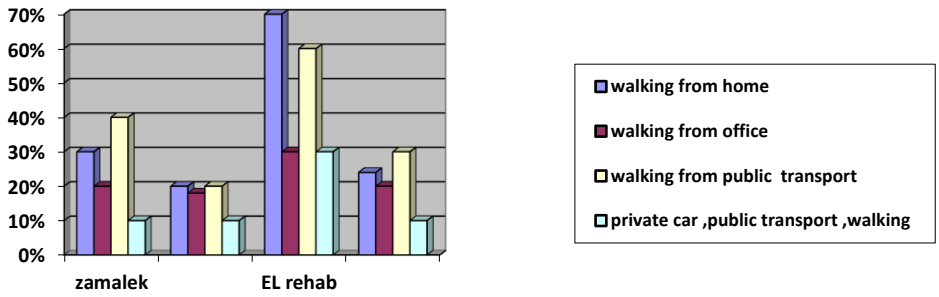

Fig (8) shows Zamalek wlalking form goal ,comparatively with ELRehab ,source the author

By assessing these alternative solutions, the study clarifies its effectiveness in crossings, expanding pavements, implementing urban furniture as an entire pedestrian network, fulfilling the distribution of services, bus stops, and landmarks, etc.

The contribution in the study focuses on identifying the indicators needed for the walkability, as shown in Fig (8), studying the relationship between the district size as a radius, and the walking distance, within timing taken, as an effective rule in assessment. When the population density increase, thus the boundaries increase to absorb the population. As whenever the district is large, the walking distances increase in range, it should be multi-centered, to shorten the distance, achieving different facilities within 320 m range. Walking City assessing the walkability of the major urban through fore's of Cairo (Doctoral dissertation). Activities within 5 to 10 min walk 402 m (1/4) mile, from work or home in the good weather, the goal is how to achieve a sustainable environmental for the pedestrian and identifying the factors that can reduce traffic speeds as shown in Fig (8), based on safety for our health, to apply stability in social, and economical sectors (Macdonald, Szibbo, Eisenstein, & Mozingo, 2018).

1.2. Elements That Encourage Walkability, And Multi-Activities

The average for both trips just over 20 minutes, which translate to about 1.25 miles (El Saied, El Gezawi, & El Sayad, 2020). Pedestrians prefer to limit walking distances and will often take unusual shortcuts to save a few steps or a few seconds of time. Pedestrians will generally not travel furthermore than 600 feet to use a pedestrian overpass. Acceptable walking distances depend on trip purpose, total travel time related to this purpose, physical condition of the pedestrian, walking environmental, perceived safety, and security of the walking routes, as shown in Fig (9).

2. MEASURING WALKABILITY TANGIBLE

Walk Score measures the walkability of any specific trip address by using a patented system for each address, Walk Score measures the friendly walking routes near amenities relevant to road metrics, analyzing the population density, in ratio to block length (Forsyth, 2015). The development of walkability is identified by both measuring Tool for walkability in the Street and the scale of the case study. On the other side (Frank, & Engelke, 2005) defines walkability, the method to reduce trip walking time, and pedestrian walk speed. Borders as a legal physical space referred to the binary logic that stimulated a method for new solutions to mark borders as shown in Fig (9). Calculating the physical interval walkability time to the walking trip distance taken for a targeted area within a five-minute, 10-minute and 15-minute. Compare this with the applicable area taken the pedestrian, to define the fact obstacles that create delays for walking speed. Create the link the difference between the theoretical and actual areas increases. Assign a value to each type of severance a pedestrian encounter based on a judgment of the difficulty that it causes the pedestrian and calculate an 'index' for each trip origin and destination pair.

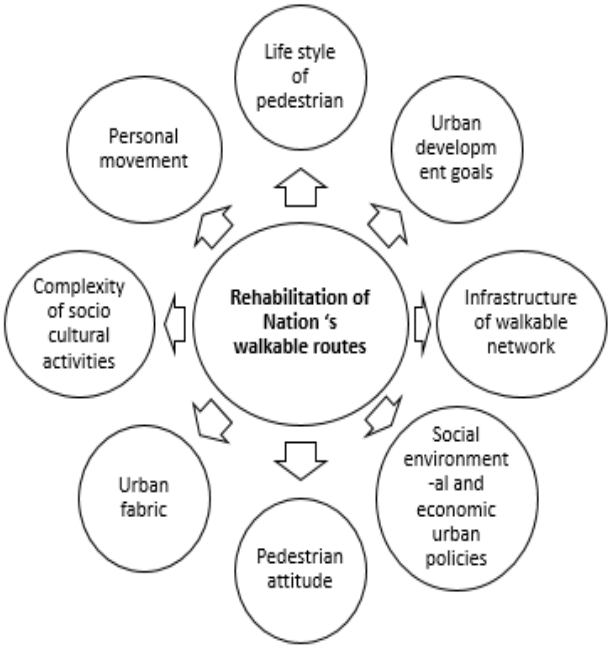

Fig (9) shows rehabilitation of sidewalks in Zamalek, to upgrade the street network as it is not shaded, Source (Weinberger & Sweet 2012).

2.1. Walkability as a Social Equity Element

Its goal is a multi-dimensional solution in preserving the environment. There are physical tools measuring the quality of walking, related to the building height, street and block length, and sidewalk width to define the physical perception of walkability as a holistic solution, not individual, as it is used among urbanism study, and widely spread in US. The most important measurements are based on a rating scale that is taken on video clips for the streets, such as transparency, legibility, enclosure, and human scale as shown in Fig (9). This experience is based on united states in surveying

48 streets and apply their panel on the fact attitude through this video clips, to measure the walkability operation in a realistic way, according to Essen's report, the measurement of walkability depends on the weight factors calculation.

2.2. Evaluation Criteria for the District

The Development of Walking Corridor. The core values are also components of the vision for the corridor. Core values include in priority order such as Scenic beauty-preservation of scenic features and viewpoints; Public safety-preventing crashes. Providing efficiently emergency services, environmental preservation-maintaining the natural and physical environmental; the multi-modal-provisions for modes of travel that include bicycles and walking, transit; Character-the unique look and feel of the corridor; and walkability-ability of pedestrians to circulate in the corridor and reach points within the corridor, as shown in Fig (10).

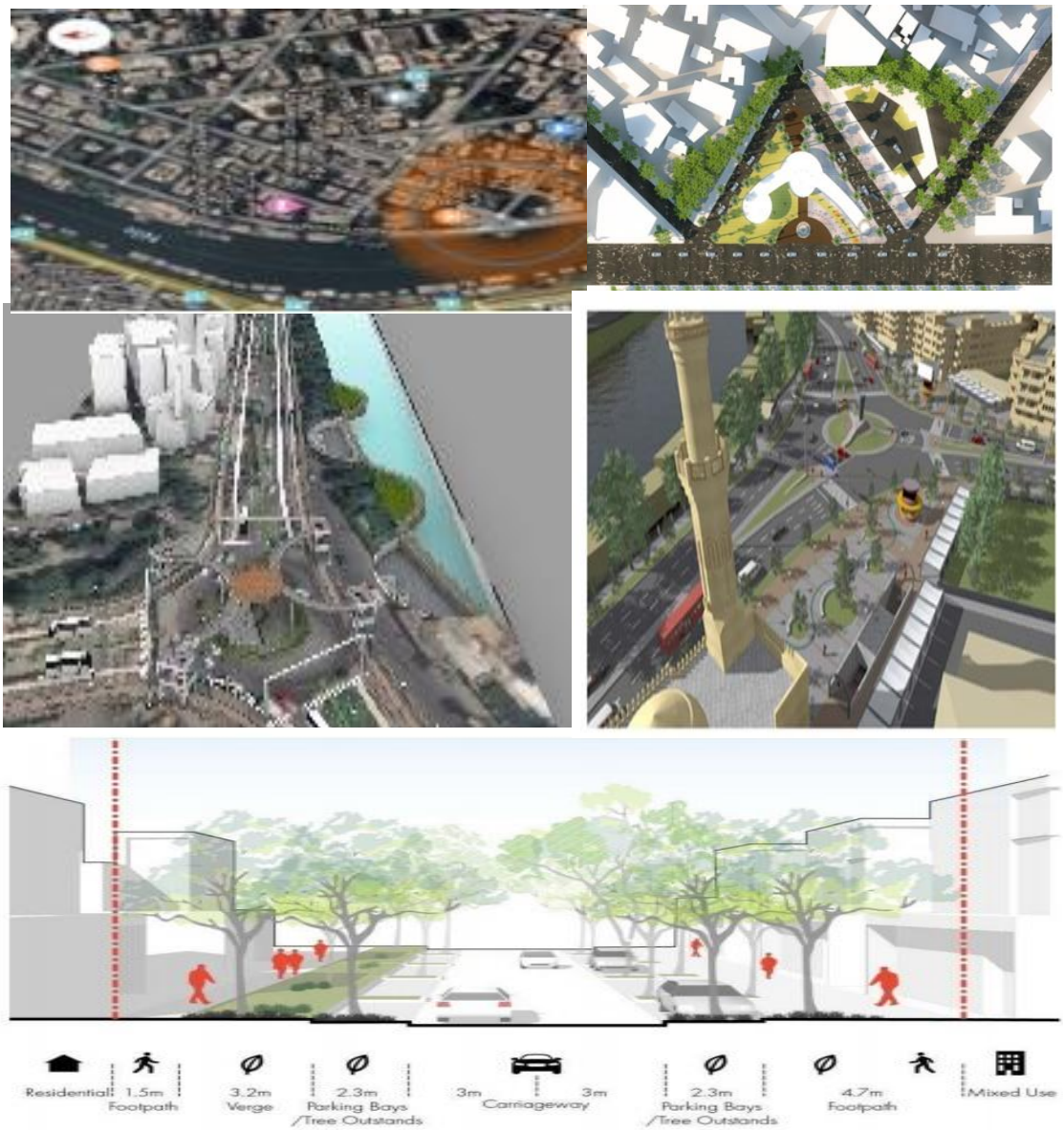

Fig (10) shows suggested alternative for Zamalek, relevant to land and walkability, source the author.

2.3. Creating Networks along the District

To create effective networks, there should be diversity generated along these routes, to increase the density of walkability as shown in Fig (11), relevant to the population, to reduce using cars 25person/acre, density is 65person/acre (Alfonzo, 2005).

3. THE FEATURES OF THE STREETS (NONPHYSICAL-PHYSICAL)

The identity of walking routes is relevant to the type of resident, area location, size, and policy context shown in fig (10) identified functions of enclosure, should include security features, amenities, and facilities. These eight characteristics may be expanded into a checklist that would be useful in case studies of the districts as an attachment to their districts. The street image ability is transparency image its vertical elements from trees, walls, and buildings, that are important physical indicator for walkability to see beyond the street edge, as shown in Fig (11). Pedestrian traffic is measured relevant to the district or district layout, whether it is a traditional grid or fused grid as several authors apply their study investigation layouts within an area of 800 x 800 meters, as local facilities relevant to the population density per hectare, to analyze the walk share of trips within layouts (Alfonzo, 2005). Identity, do residents feel that they have much in common?
Connections, are residents involved in political and other such activities outside the Distance.

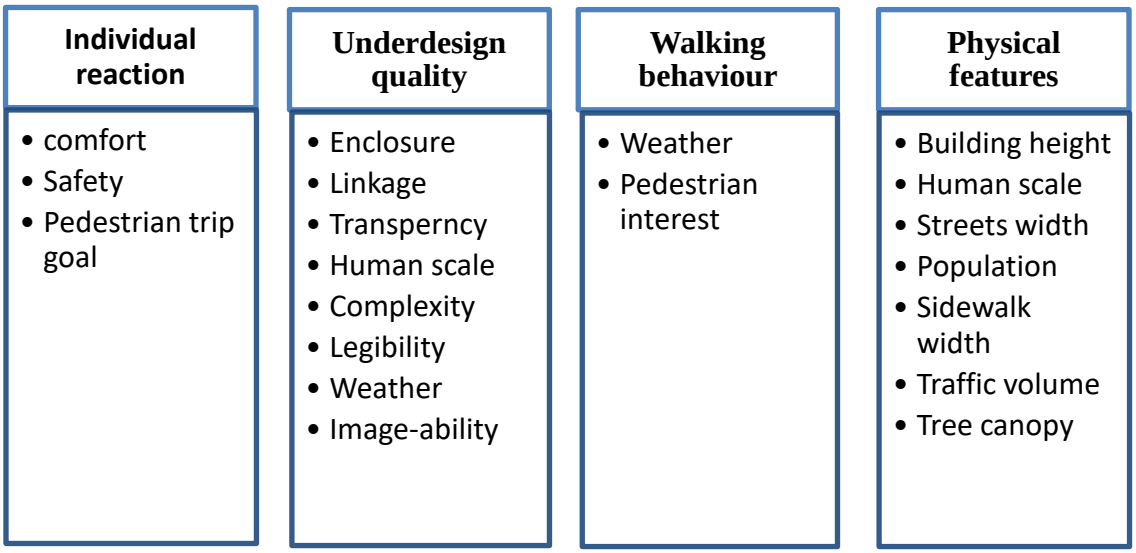

Fig (11) shows physical features affecting walkability elements, source the author.

3.1. Purpose of Trip Distance (Miles) Duration (Minutes)

Pedestrian categories are classified on the type of user burden, for example, pregnant women, blind people, mentally disabled and deranged people. In addition, the disabled can be classified further to those using a wheelchair, those using realtor and those using crutches or canes. Mothers (or fathers) with little children constitute a vulnerable group as well. Maximum distance for walkability to or from work (0.74-10.86), Work-related business (0.5-9.11), Shopping (0.44-9.42), another family or (0.45-9.06), School/mosque, church (0.55 -10.89), other social/recreational (0.64, 12.74). How smart are smart cities? How can large data influence the planning of sustainable urban mobility? Substitute the catchment distances, Catchment (Schools), Use '1 mile (1600 meters) as the catchment distance for schools. Define Catchment (Parks) as for using 0.125 mile (200 meters) as the catchment distance for parks. Catchment (Transit),

such as Use 0.25 mile (400 meters) as the catchment distance for local bus stops, use 0.5 mile (800 meters) as the catchment distance for rail transit stops as shown in Fig (12). Calculate a journey time based on the length of the routes and average walking speed, considering obstacles, gradient changes severance that change walking speed or create delays, according to human needs, related to walking in city (Je, Lim, Moon, Teng, Brooks, Lopes, & Bianchi, 2021).

3.2. Classification of Walkability Indexes in Zamalek Case Study

Walkability as a sustainable approach for urban development is essential integrated transportation in urban contexts for a long-term, to let Egypt within the list of the worlds' most livable cities as shown in Fig (12). It contains various indicators and variables, based on applying the rated scale for walkability degrees that range is (2.1-5), as an important variable. This tool can be applied in Egypt with needed adaptations, based on the (SPI), (SQI), and indexes of streets, physical, and climate, (Alfonzo, (2005).

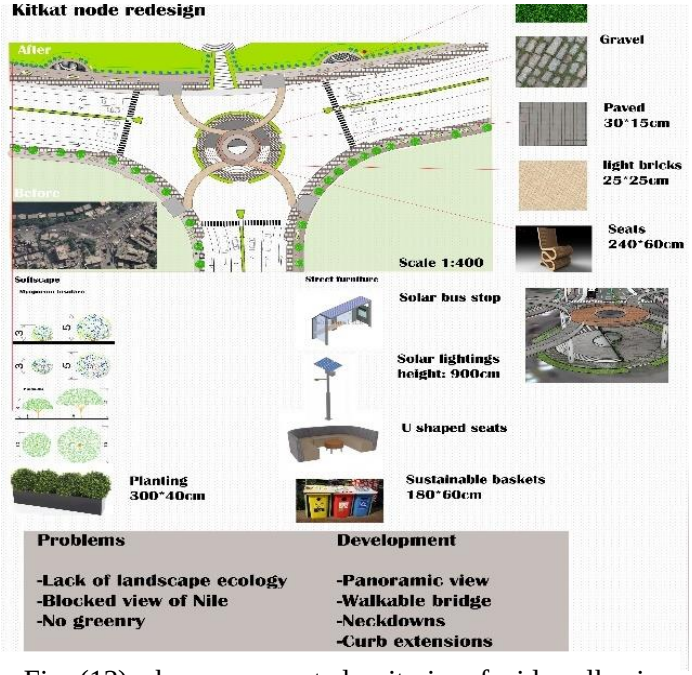

Fig (12) shows suggested criteria of sidewalks in Zamalek, to upgrade street network as it is not shaded, Source the author.

Table (1) shows walkability features and index classification (Essen's report acts as a reference tool). Designing places for healthy lives, Design Council a short guide. Active Design, shaping the sidewalk experience.

Zamalek street network link, and shortage in parking area, (criteria weight = 30%) (Environmental impact)	**New guidelines to approach a better walkability (Environmental impact), (Bereitschaft, 2018).**		
Index	The Category	score	The Category weight
Sidewalk width	No sidewalk < 1.5 >5m	Most sidewalk 1.5	10%
Obstacle hindrance Zamalek street network link, and shortage in parking area, (criteria weight = 30%) (Environmental impact)	Too distributing	3%	15%

Source: the author.

Table (2) shows new guidelines to approach walkability.

Zamalek street frontage, and building heights (Social impact) To define neighborhood, and its community identity. (Criteria weight = 30%) This index uses observational survey data to calculate an environmental quality score for roadway segments based on five categories of indicators such as, intersection safety, traffic characteristics, street design, land use, and perceived safety (Dietrich, & Kengyel, 2016). Zamalek land use shown in the Increase the number of trailheads that are accessible from the corridor. (Criteria weight = 35%) (Criteria weight = 35%)	Pedestrian Environmental Data Scan method is a measurement tool for the pedestrian use as observational survey data to calculate a pedestrian environmental score for roadway segments based on five categories of indicators such as, environmental, a pedestrian facility, road attributes, walking/cycling environmental, and a subjective assessment (Dietrich, & Kengyel, 2016). Can mean that the greatest number of the pedestrians benefit from the Treatment to identify high profile schemes that help demonstrate a commitment to walking? May reflect latent demands, the study imputes on creating social greenways networks as a main basic structure for nation districts. Design Curb Ramp as pedestrian Usability Considerations. Implement Street Furniture and Equipment to facilitate the walkability for the pedestrian. Implement landscape along all routes to filter air and increase shading. (Dietrich, & Kengyel, 2016).

Index	The category	Score	Weight from 0 to 9
Bad condition	1	6%	6
High condition	1	4%	4
High population	1	9%	9
Low population	0	1%	1
Good landmark	0	0%	0

Zamalek street network link, and shortage in parking area, (criteria weight = 30%) (Environmental impact).				New guidelines to approach a better walkability in Zamalek.			
Buffer	Curb, Parking area, a green area	5%	5%	Street type	Score	The category	No pedestrian zone
Accessibility, Barrier	Partially	4%	7%	One-way street	4		20%
Sidewalk width and the street width ratio	<50%	1.5 %	15 %	Local street	2		10%
				Arterial	1		None
				Sub arterial	1		3%
				Collector	2		10%

Source: the author.

Table (3) shows new guidelines to approach walkability.

• Percentage of the facades that are historical, Proportion of historic buildings facade length. • Percentage of landscape features. • Average of small Planters. • Average of buildings height to the walking space. • No of non- rectangular shaped buildings. • Average buildings with iconic identifiers. • Percentage of the facades that are historical, Proportion of historic buildings facade length. • Percentage of green spaces, accessible to the pedestrian and courtyards, and parks. • A measurement tool to measure single weight for the walkability index as an urban quality based on the Essen's report the Street Physical Index (SPI) plus the Street Quality Index (SQI). Simply multiplying each weight factor to the related score factor and then dividing the total weight, a single weight factor would be assigned to every single index. Using walkability, The category final score = weight score x street type index weight factor /100x criteria weight/100 Single index Degree = (SPI street physical index x related score factor) + (SQI street quality index x each weight factor) / total weight 100) Feasibility in Walk score shows Mix Land use, measuring the percentage of stores, or nonresidential ground floor uses (Destination diversity), Access to formal or informal public Transportation.	
Index (extracted from the Essen's report) physical indexes (extracted from the Essen's report) physical indexes. Walkability checklist covers facilities that indicate what present/absent, measured, and traffic conditions (e.g., sidewalk connectivity, condition, crossings, signals, perceived traffic conditions, and ambience). PADOT Walkability Checklist This checklist includes factor s present/absent and focuses on the comfort and safety of walking within the community. Accessibility in Walk score is identifying Room for walking. Connection of sidewalk Connected to pedestrian infrastructure. Number of outdoor public spaces, as seating areas and Restaurants, average flow density of people, average flow density of people. Good aesthetical view, with Proportion of windows at street Level.	The maximum score factor adapts to other score factors. The street hierarchy type index, the maximum score factor is 5 and the final score for an arterial road is one. (Relationship between urban qualities, as walkability Index (IWI) in the Essen's report and physical characteristics The street traffic type, the street hierarchy type, and Parked cars) physical indexes. Index (extracted from the Essen's report) physical indexes (extracted from the Essen's report) physical indexes. Walkability checklist covers facilities that indicate what present/absent, measured, and traffic conditions (e.g., sidewalk connectivity, condition, crossings, signals, perceived traffic conditions, and ambience).

Source: the author.

Table (4) shows new guidelines to approach walkability**.**

system (calculate the final score), for comfort • Percentage of lighting places and street furniture items • percentage of garbage piles, as littering, vandalism, etc....items • aesthetic view for pedestrian's vision and Proportion of sky. Proportion of street frontage as building facades facing the walking spaces.	**system (calculate the final score), Average temperature in Zamalek. (Environmental impact)** **NCHRP Multi-Modal Level of Service Analysis for urban Streets (MMLOS)**. This model measures the degree to which urban street design and operations meet the Needs of each a major mode's users (automobile, pedestrian, bicycle, and transit).

Source: the author.

CONCLUSION

The research performs analytic spatial analyses for district Zamalek as a case study, and compare it with other districts through questionnaire, assessing the connectivity, and integration values. The Framework results show that Zamalek has more mixed-use zones than the rest of districts that encourages walkability more due to connectivity of street networks, and safety, the methods used in the research can be as a future direction in planning districts setting with different walking attitude expected outcomes from sustainable transportation. The limitation in applying is the political vision in planning cities, to revitalize the urban heritage based on standards. And Consult users in the specified district on the updated changes before acting. The category weight of the obstacle hindrance has the highest score, relevant to the highest population. The most lack of walkability is in one-way street. Walkability contains lots of indicators and variables. The proposed framework includes the needed indicators to assess walkability in Districts. Assessing non-walkable streets enhance to create a rated scale for walkability, regardless to the climate, as it differs from region to the other. Measuring tool for walkability differs according to the type of citizen, their background, being a tourist or a citizen, age, gender, and their lifestyle in diverse timeframes, to perceive the highest perception for walkability. It is recommended to apply questionnaire to the users, inhabitants, as a deep investigation to each sidewalk, represented in an index scores as best condition, defining its potentials, and the measurement tool in scoring, as shown in Table (4). This research provides alterations towards advancement within the policy-making Egypt's approach for upgrading quality of life in districts' center through placing the priority of comfort and livability (Dietrich, & Kengyel, 2016). The paper evaluates the variables of indicators of walkability for the citizen, besides evaluating the criteria and standards for the walkability environment for the specified region. The research shows that the lack of walkable components that affects the walking transportation among the citizens. It is proposed to evaluate the efficiency of the district policies, to avoid the gap between the user needs and the street environment (Dietrich, & Kengyel, 2016). The paper offers various solutions and alternatives in nation streets, taking Zamalek as analytical methodology tourism and specific identity of Nile frontage, to analyze street features and suggest tangible results fulfilling region need, as it is a needed strategy to enhance social, economic, and environmental impact upgrading walking as a main accessibility needed in all streets, that ensures environmental sustainability, as shown in Table (5).

Table (5) shows the walk score indicates that the study highlights on the street vendor's problems, within the time zone, preserving street visual character to assist safety and security enforcement of laws. Under certain conditions, one sidewalk on The Nile is appropriate to cope with existing land use. (Environment Indicators to Develop a Local Walkability Index. Journal of Contemporary Urban Affairs).

Criteria of walkable measurement	Identify as landmark	3	Assess solutions for recreational activity	Street façade Complexity Presence of retail stores	5	Balance ratio between open spaces and urban mass	5
Pedestrian objectives	One-way street Speed limit Pedestrian crossing type	3 5 5 3	Area of walkability	Street cleanness condition	5	Emergency Accessibility	4
Planning crossing opportunities	Street width ratio Pedestrian crosswalk	5	Personal movement	High population	5	Walking trip time scale	5
Lifestyle of pedestrian	Walking behavioral streets	5	Societal benefits	Solving the intersections, in each activity.	5	Mixed uses in walkable streets	3
Infrastructure of walkable network	Street zoning Subdivision of streets into segments	5	Mixed uses in walkable streets	Keeping visual architecture character	3	Walking trip distance	4
Criteria of walkable measurements	Presence of public spaces, and supermarkets	4	Shaded walkable routes	Presence of public space	5	Enclosure	3
Define the walkable trip goals and targeted nodes	Green Park Work Home Public transportations	 4 4 3 5	Pedestrian attitude	Solving pedestrian car intersection through junctions	5	Public services, safe crossing	3
Tree canopy Sustainable approach Responding to the diverse needs	Single trees Tree row Buffer.	3 3 4 5	Pedestrian Objectives Sustainable image-ability	Promoting heath sitting Services circulation	5 5	Urban fabric Urban features, Lighting and benches	4 4

Source: the author.

The pedestrian circulation should have specified zone, away from the interfering of block entrances and Utilities. General principles in assessing the appropriate design of the pedestrian routes, on being straight-line routes to minimize deflection land from potential walk experience, and alleys cross sidewalks. Hence, the policies and regulations are to upgrade Quality of life in the city, as holistic solution that have positive impact on social, environmental, and economic activities. The noise pollution is the most affective problem on pedestrians. Built a green public space mixed within a green node that interconnected densely, with equal access to services and facilities, to provide social equity. Assess street connectivity/maintenance as a main indicator, as high intersection densities provide more potential routes for walking and greater accessibility. Design the pedestrian catchment areas for primary and secondary facilities for encouraging a daily physical activity. Road hierarchy is widely needed in the checklist for sidewalk segments in terms of the scoring.

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