WALKABILITY BETWEEN DUBAI DEVELOPMENTS: "SEEN BUT NOT REACHED" – A PORTRAYAL ASSESSMENT OF WALKABILITY INDICES IN DUBAI, UAE

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ABSTRACT

The rapid ongoing urbanization growth in Dubai's developments has resulted in issues related to walkability and connectivity, considered as a tremendous development pressure. The aim of this study is to examine and evaluate the state and existence of physical connections within and between Dubai's developments (downtown Dubai and City Walk), in terms of walkability and the infrastructure provided for that. The assessment is based on portrayal documentation of three walkability indices (design, destination and diversity of land use). The study methodology is through use of personal experience, photographs and observations, through visitations to the case studies mentioned. The analyzed findings showed that downtown Dubai and City Walk are walkable within themselves, only through achieving the walkability indices used in this study; however, there is no supporting infrastructure for walkability just outside those developments, and certainly not between them, which creates an impossibility to walk for commuting between these two developments that are less than 1.5 km apart from each other. Thus, the essential mode of walkability for commuting between Dubai's developments was neglected and the fragmentation between nearby developments occurred because of the inconsistency in the levels of supported infrastructure and urban contexts.
Keywords: urban design, sustainability, sustainable development, downtown Dubai, City Walk, walkability, Dubai, United Arab Emirates.

1 INTRODUCTION

Dubai is the second largest city and the most important city in the United Arab Emirates. According to Alwadi and Dooling [1], "Dubai is the UAE's most developed and urbanized city and claims the nation's largest number of expatriates". Dubai became an emerging international city and a global hub as this transformation took place, from tiny fishing village into international city, due to extreme urban expansion, because of the country's capital dependence on oil as the prime origin of wealth development for the city; however, the government has diversified its economic base now, with addition of many sectors such as tourism and real estate. The main purpose of the newly constructed developments is to enhance the economic status of the city, to encourage tourism and international investments businesses from abroad. Consequently, that enhanced Dubai's stand as one of the most global and multi-cultural cities in the world.

In spite all of these mega-projects, Dubai is still struggling with defining or redefining its urban context, based on the chronology of the country's history, culture and traditions of the native residents. According to Alawadi and Dooling [1], understanding the context locally will definitely facilitate the implementation processes to achieve a model of sustainability in Dubai for different aspects, like promoting walkability for sustainable purposes as a commuting mode; due to the complexity of different aspects of culture, history and tradition. Furthermore, the infrastructure has shown a solid basis for supporting all those developments, yet the problems of connectivity and integration in terms of walkability have appeared.

Alawadi [2] states: "Dubai is an automobile-dependent city; most of its urban areas sit inside large super blocks surrounded by multi-lane highways and grade-separated interchanges that restrain accessibility". That indicates the difficult conditions that the city will encounter when implementing methods of integration and connectivity, as the only intended integration between the city's mega-developments is through mobilized transportation. The argument here is that the walkability experience ends once people step out of their developments. The goal of this research paper is to examine and evaluate to what extent walkability can be applied throughout the specific developments in Dubai.

2 METHODOLOGY

This study will analyze relationships in terms of integration and physical connectivity through walkability indices between two major developments in Dubai. The main examination will focus on the route between downtown Dubai and City Walk in the Safa district, under the current conditions. As suitable, photographs will be employed to document the status of the urban developments, and observations will be shown as personal notes regarding the walkability of the journey between the two developments, and within each other. As stated in the body of literature by Lynch [3] in regard to the path of legibility of any walkable journey, from where many elements could be observed, is very much related to spatiality of the physical infrastructure. The corresponding infrastructure will be criticized as to whether it is sufficient to support the claims of the argument. Other digital tools will be used, such as Google Earth; to measure, calculate, and show distances and area.

3 WALKABILITY VERSUS VEHICLE

Sustainable urban developments always sustain a high level of accessibility and permeability. Such methodologies should be planned in parallel with the urban context of the urban space. In order to reach high levels of sustainability in developments, a suitable infrastructure should be provided, to support different types of transportation along with different types of streets and commuting, starting from a basic walk and ending up with mass transportation like a metro or trains. According to Galal Ahmed and Naser Ali [4], because of the created environment, the urban form shows high linkage with human behavior. That leads to encouraging individuals to use their urban space in an active way. They refer to Frey [5] when he pointed out the previous concepts; "Frey argues that the three major factors that affect the 'microstructure' of a city are: Accessibility, Proximity and Functional mix".

Nonetheless, according to Galychyn and Ustundag [6], the usage of the Dubai metro is still not efficient among the residents of Dubai. Generally, the Dubai metro is seen as a front for the city of Dubai or as the city's image, to demonstrate Dubai's strong infrastructure setup by the Road and Transportation Authority (RTA) [7]. Correspondingly, Maclolm [8] argued that in Dubai, the metro is considered as a touristic experience, which is labeled as a must-do in Dubai, which indicates that it is soon before the people will consider Dubai metro as one of their main mass transit transportation methods. That also stresses on the existence of a very poor index for walkability in the urban space. Similarly, it goes with cycling as the abandoned tool of advancement in keeping a sustainable city. Even though there are some developments in Dubai that encourage cycling, like downtown Dubai and the beach, their goal is to provide this practice as "sport or leisure", and not as a way to commute around the city and "between developments".

4 WALKABILITY INDICES

According to Habibian and Hosseinzadeh [9], "Walkability is a measure of how friendly an area is to walking". There is a strong relationship between walkability and the built

environment. The extent to which the built environment boosts the comfortable and safe walking trips could be defined as the main concept of walkability [10].

Researchers have concentrated on triggers that will encourage people to rely more on walkability in their daily routines [9]. Misunderstanding of the elements that could affect walkability had its own problematic results. Solid literature gave definitions for the walkability elements or indices that can be measured quantitively, which had been done by many scholars in different cities and contexts. According to Tsiompras and Photis [10], the built environment and people's travel behavior should be assessed, in order to measure walkability. The built environment could be measured through the composite attributes of walkability that illustrate the easiness and friendliness of a commute. The main elements associated with walkability are: mixed-land use, connectivity, diversity of destinations and density. So "much of the physical activity and built environment literature has focused on composite walkability indices based on the D variables – design, density, diversity, destination accessibility and distance to transit" [11].

In this study, the walkability indices that will be evaluated are design, destination accessibility and diversity of land use. Those indices will be examined through the methodology, as supporting evidence to define the nature of walkability, its existence once within the developments and the space between them. To get familiar with the definitions of those indices, the body of literature by Habibian and Hosseinzadeh [9] was summarized here:

1. Design relates more to the connectivity of streets and roads, as "a well-connected road network, which is suitable for walking is a network that has many short links, numerous intersections and minimal dead-ends (cul-de-sacs)".
2. "Destination accessibility is defined as the ease of reaching different destination locations", which can be through suitable infrastructure and safe facilities.
3. Diversity refers to the different land uses; like residential, commercial, entertainment and offices.

Purposes for walkability were not included in this study, as it requires another methodology and more study on human behavior. The scope of this study is simply to evaluate walkability indices in our built environment.

5 CONCEPTUAL FRAMEWORK

As the body of literature previously proposed the basis to assess walkability in terms of three indices; design, destination and diversity, the proposed conceptual framework (Fig. 1) aims to evaluate walkability within the built environment (developments of downtown Dubai and City Walk): once separately, and then as a wholistic development. The assessment will also be done on the space between them, to conclude whether it supports the walkability indices.
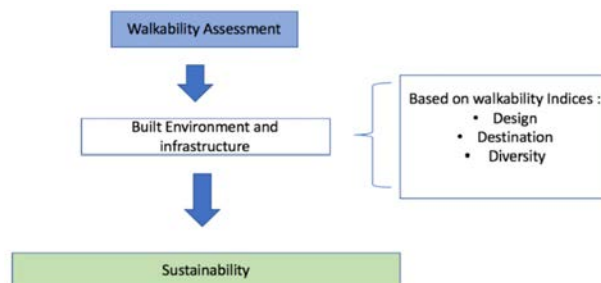

Figure 1: Conceptual framework.

The case studies will be evaluated based on the definitions of the three indices and how they are implemented in downtown Dubai, City Walk and in the space between them. Consequently, this will provide an understanding of that built environment and will show the relationship to sustainability, in terms of walkability.

The portrayal of our findings on the three indices should define if the two developments are connected physically through a walkable infrastructure, so they are part of a sustainable urban space. In case they lack the proper intermediate infrastructure that supports walkability, they could also each be named as enclosed sustainable developments, as per scoring by the three defined walkability indices.

6 WALKABILITY ANALYSIS OF THE CASE STUDIES

6.1 Downtown Dubai (Mohammed Bin Rashid Boulevard)

When establishing a development in any urbanized space, the aspects of sustainability should be grounded, in order to achieve a sustainable development. Furthermore, such developments have certain criteria in terms of design, accessibility, density, and more. Useful literature about sustainable development was introduced by Frey in 1999 [5] on page 23, as he defines sustainable development. The *Urban Master Planning Handbook* by Firley and Grön [12], proposes useful literature about analyzing the urban situation, such as in downtown Dubai.

Downtown Dubai is a significant development that defines "The Center of Now" as Dubai's mega-urban phenomenon. The project emphasizes mixed-use land, as it includes residential, commercial and open spaces that have noticeable greenery. It shows a strong infrastructure if related to the usage of public transportation, as well as cycling and walkability enhancements on an area spread out over 200 hectares. The layout of Dubai's development doesn't follow a typical grid system, and the main spine of the project is a ring-shaped road named "Mohammed bin Rashid Boulevard or MBR Boulevard". In addition to the Burj Khalifa, Dubai Mall, the Dubai Opera, and hundreds of residential and commercial skyscrapers located in downtown Dubai, there is the Burj Khalifa metro station and the Dubai metro link.

The Dubai metro link from the Dubai Mall to Burj Khalifa metro station is an 820 m length connection, to facilitate the way to reach the Dubai metro directly from Dubai Mall. Based on personal experience, The Dubai Link is not an efficient method to reach the Burj Khalifa metro station, because the only way to enter the Dubai Link is through the Dubai Mall.

To measure walkability through *design*, which means the existence of several efficient street intersections and a grid that will facilitate both movement and accessibility to the place. There are almost 13 intersections with Mohammed Bin Rashid Boulevard for vehicles, which is the main spine of downtown Dubai; and it's even easy to enter the whole development from the main road (Safa Street), which has levels of the supported roads in layers ("Upper" and "Lower") for reaching the Dubai Mall's parking area easily, as well as generally to downtown Dubai.

Furthermore, MBR Boulevard has plenty of signaled cross-walks for pedestrians to walk freely and cross the two sides of the boulevard (Fig. 2). Regarding the destination, our case study illustrated many different destinations that encourage people to walk to (Fig. 3). Furthermore, there is pedestrian landscaping with proper aesthetics that add identity and attachment to the place (Fig. 3). In addition, public transits are located conveniently on MBR Boulevard, like bus stops and taxi side stops.
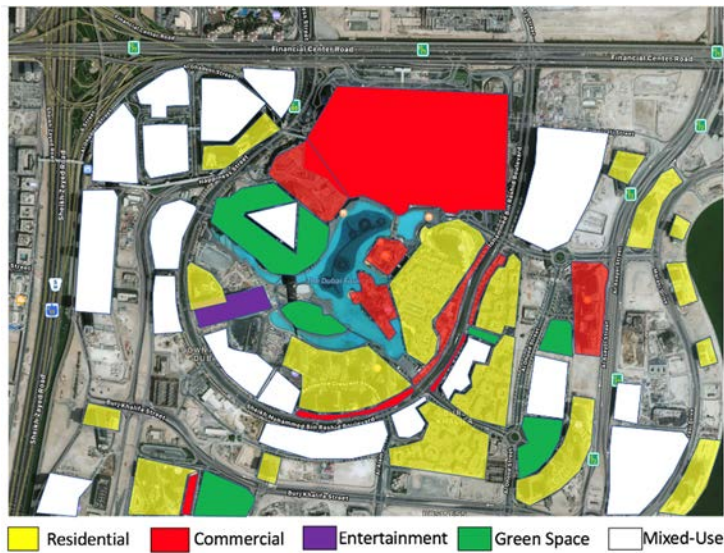
Figure 2: Dubai's downtown land uses. *(Source: Firley and Grön [12] and first author.)*

Figure 3: Different aesthetic landscaping in downtown Dubai. *(Source: First author.)*

To specify the diversity, there is a division of different land uses for downtown Dubai, as shown in Fig. 2. As seen in the illustration, downtown Dubai has different land uses: residential, commercial, entertainment and also green space, to add more pleasant places to reflect in the greenery and use the concept of open spaces.

6.2 City Walk

According to Malcolm [8], City Walk is one of the recent development projects in Dubai, in Al Safa district. The development's 12-hectare area features a walkable, car-free urban space along with sections for outlets, retail shops, restaurants, cafes and entertainment. It lies in a north-western direction on the main Safa Street that goes directly to Dubai Mall and downtown Dubai. City Walk introduces a walkable development where people are engaged in many activities related to social, cultural, health, shopping and entertainment practices (Fig. 4). City Walk is a sustainable development within itself. Yet, no evidence was found to support the claim that there is a relation to the surrounding context of the urban space.
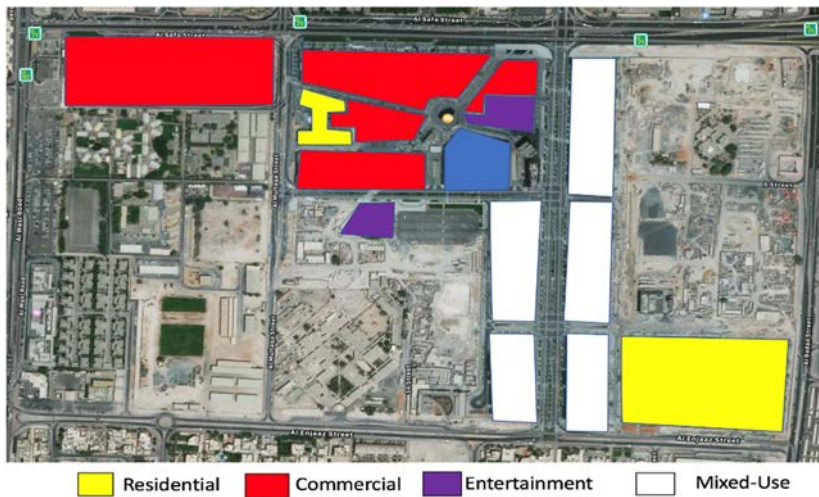
Figure 4: Land Uses in City Walk. *(Sources: Google Earth [13] and first author.)*

In terms of design, City Walk is non-motorized development and it's fully walkable within its boundaries. The main gathering node in the development is the center space where the main four pathways are combined as the heart of the development. The whole development is bounded by main streets and the car parking lots are located underground, and limited parking space is also located onsite, just south-west of City Walk. Adequate destinations could be accessible within City Walk; like restaurants, cafes, play areas, etc. Different landscaping and furnishing can be observed throughout the development, as the space is decorated with benches, trees and sculptures (Fig. 5). All of that enhances the people's experience and attracts them more, by encouraging outdoor activities.
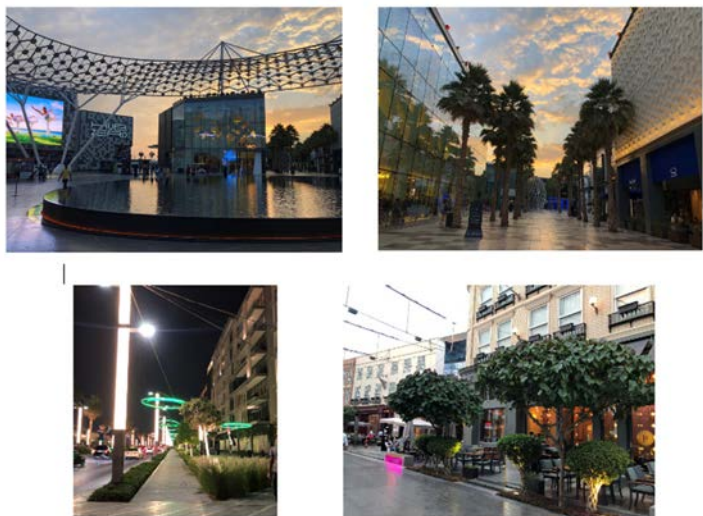

Figure 5: Various landscaping seen in City Walk. *(Source: First author.)*

The diversity of land uses in City Walk is highly varied; however, it is not as dense as in downtown Dubai, because of the scale and the built area size. Besides the commercial, retail and entertainment facilities that occupy the land in the development, City Walk has introduced new blocks of mixed-use, combining the residential and commercial purposes onto one site. Those are located not in the walkable part of the City Walk development, but in other parts, where streets play a vital role to attract people. This partially breaks the concept of a "totally walkable development". One the other hand, it is essential to connect residential housing building with streets, to provide logistic easiness of services and in the case of emergencies. Another thing is that City Walk does not introduce any green spaces what so ever, which would have been a complete model of mixed-land use, to emphasize the sustainable concept.

6.3 Between downtown Dubai and City Walk

In order to evaluate and measure the possibility and existence of walkability in the space between downtown Dubai and City Walk, the author personally documented the observations and obstacles on this walking trip between the two developments, which are less than 1.5 km apart (Fig. 6). The assumed argument was that there is not sufficient infrastructure that allows people to commute by walking between these two mega-developments in Dubai (downtown Dubai and City Walk). The trip began in downtown Dubai, at the beginning of MBR Boulevard (The Dubai Mall), at approximately 3:00 pm on Thursday, 18 October 2018. The walk along MBR boulevard was pleasant. Once one reached the end of MBR Boulevard, it was impossible to get into the Dubai link, as it is only accessible from inside the Dubai Mall. In general, the walk from that point to Burj Khalifs Metro station was acceptable, but not very efficient, as many of the pedestrianized features were gone.

Figure 6:   Between downtown Dubai and City Walk. *(Sources: Google Earth [13] and the first author.)*

Standing at the edge of the downtown Dubai development and facing Sheikh Zayed highway, which is considered as the main arterial street in Dubai, the only way to cross the highway to the other side was using the hanging bridge (Fig. 6) that connects the two Burj Khalifa metro stations together. After crossing Sheikh Zayed road, another level of facilities

was introduced, as if it was another city. The paved walkways got narrow and tiny corridors between buildings appeared. Burj Khalif could be seen from this point, but it required much effort to reach it now. It was a land with streets and an underground tunnel leading to further districts. No indicators of the three indices (Design, Destinations and Diversity) were observed nor implemented there. The next part of the walk showed quite a lot of obstacles and very limited infrastructure to be able to walk, for commuting. No crossways for pedestrians were made, nor ones for cycling. The streets had meshed metal fence barriers that did not allow people to cross the street randomly. The paved walkways did not serve well as a walkway, as they were like separators between the edges of the street.

In Fig. 7A–C, the assumed paved "walkway" is very narrow, and is located beside a wall, then it got divided up to be an underground tunnel through, and the other upper part kept leading along the street: in both cases it is super dangerous and unsuitable to walk on. In Fig. 7D and E, getting closer to City Walk, the area started to show some landscaping, as the greenery spaces started to accompany wider and shaded walkways. In Fig. 7F, Burj Khalifa could be seen from the place behind the low-rise mixed-use buildings near the Burj Khalifa metro station. The walking distance in this journey was approximately 3.5 km and the duration was almost 2 hours. One situation observed during this trip was due to the absence of slopes for the paved walkways and without a suitable place to cross the street, so cyclists had to carry their bicycles and run across the street.

In order to explore all the possible ways to walk for commuting between the two developments, another walking route was used to measure walkability, starting from City Walk towards downtown Dubai. This route was never designed for pedestrians, as it has an infrastructure that is only vehicle-oriented. Bridges, wide streets, combined lanes and absolutely no pedestrian walkways are there and were the main elements of this trip.

Walking Route from Dubai Downtown to City Walk

Figure 7:   Walking route from downtown Dubai to City Walk. *(Sources: Lynch [3], Google Earth [13] and the first author.)*

As illustrated in Fig. 8, this other route had its own obstacles regarding walkability, and the absence of the safe and secure infrastructure for that. The reason is that this route is designed totally for vehicles, assuming no pedestrian would use it for walking; however, while using this route, it was laborious to walk on this exact route for commuting, not necessary from City Walk, but from the area near it or opposite it to reach downtown Dubai or specifically to Dubai Mall. In Fig. 8A, Burj Khalifa is viewed from one pathway of City Walk that offers a visual connection to the highest skyscraper in the world, yet an observer will never imagine how to reach that place in any means but by their own car, and here is where we got the expression "Seen but not reached". According to the Cullen [14] literature, the art of the relationship between the observer and the buildings could be visual, as concluded from this experience.

In Fig. 8B, the narrow pavement did not encourage walkability nor use of it for cycling, as it is very dangerous, and its width is only 90 cm. Fig. 8C–G portray the different views that walking on those bridges offer. Sheikh Zayed road showcases the skyscrapers as evidence of rapid urban growth. The strong and solid infrastructure of bridges and heights with their supported piers completely shouts out that this is an automobile city, that almost everything is designed to support cars, and that this is not a human-scaled environment. Even under those bridges, there is no possibility to cross the street. The drivers and users of those bridges are sure that no human being will cross those streets, nor walk beside the road, and due to that their driving speed is very high. The total walking distance of this route was 2.4 km and the duration of the trip was almost 1 h 40 min.
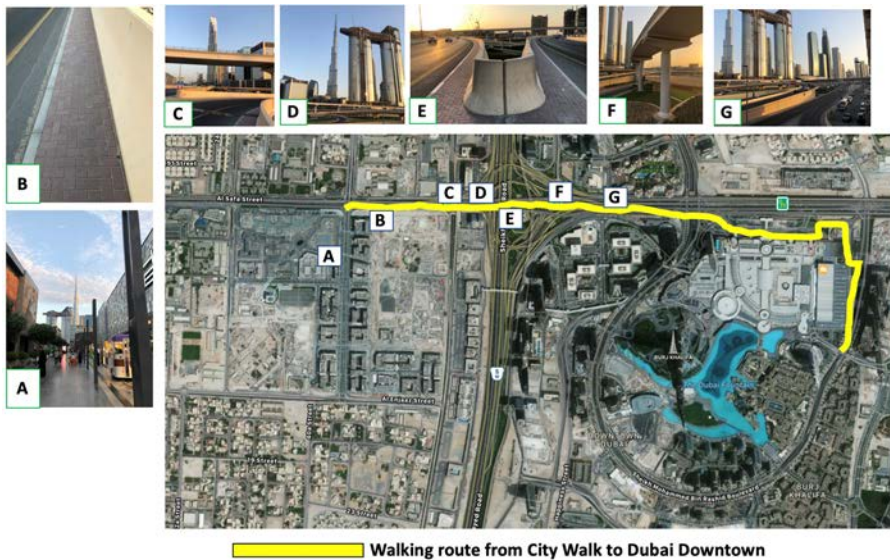

Walking route from City Walk to Dubai Downtown

Figure 8:   Different route to examine walkability for commuting between City Walk and downtown Dubai. *(Source: Lynch [3], Google Earth [13] and first author.)*

7 DISCUSSION

From the analyzed results, one can argue that some developments in Dubai support walkability, only within certain defined development boundaries, to achieve economic and environmental objectives. The case studies examined in this research showed no suitable or

safe physical connections, nor any integration in terms of having walkability between the two major locations, which were less than 2.0 km apart. The infrastructure does not support such behavior, even if people decided to walk from downtown Dubai to City Walk for the purpose of commuting, sports or just for entertainment; taking into consideration that those two developments are nearby and within a walkable distance only if what is required existed.

People tend to walk when walkability is enhanced and encouraged through beautiful landscaping, shaded walkways, different intersections with an ease of reaching them, a diversity of facilities and destinations, and a combination of mixed land uses, so that everything will be within reach of a walk. That is what exists in both downtown Dubai and City Walk, yet is lacking in the abandoned area between them, where it feels like being in another disconnected city, just hundred meters away from the highest tower in the world.

Furthermore, solid decisions regarding enhancing walkability in Dubai should be outlined more strongly, by the policy makers and the regulating authorities. According to Alawadi and Dooling [1], enormous buildings were constructed in Dubai without any reference to the urban context nor the local unique theme, and such misconduct could have been avoided if public participation had been involved in the urban planning process, or if any contextual study was performed: "public engagement might reduce the accelerated pace of decision-making and implementation processes which resulted in many developments that are neither culturally nor environmentally sensitive". The emphasis on sustainable methods needs to occur, to retrofit the strategies of developments in our current Dubai [2].

Organic urban planning is the process of city design and arranging of physical forms in a sustainable and healthy way, which can be outlined using the conservative techniques found in sustaining resources. The human-scale factors are essential components of urbanized design. According to Galychyn and Üstundağ [6], cities should be designed in a way to facilitate the integration of clean public transportation into the planning aim towards attaining transit-oriented developments. Consequently, such practices will limit one-vehicle use, due to prioritizing both enhanced walkability and cyclability. As a result, the streets will be partially taken from the cars back to citizens. "Non-motorized transportation is the main pattern of transportation in people's life, such as shopping, going for a walk or temporarily repast is all dependent on the walking" [15]. Consequently, it is argued that reducing motorized transportation will defiantly play an effective role to achieve partial sustainability socially, environmentally and economically.

8 CONCLUSIONS

To conclude, we achieved the objectives of this study and the methodology used was found suitable for this pilot study about walkability in Dubai. A limitation to be mentioned, is that in this research, the purposes for that walkability were not clearly defined. That is due to not focusing on the human factor, but only on the physical built environment and infrastructure there to allow for walkability, and evaluating it based on three indices (Design, Destinations and Diversity). Further investigation could add the human factor as well, to the equation. A survey questionnaire could be distributed to find out exactly what people need to be added to the urban context of Dubai, to make it healthier and more walkable.

ACKNOWLEDGEMENTS

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