Developing Street Network in Gharb El-Balad District, Assiut City: Towards Sustainable Transportation

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Abstract

Transportation is a key necessity for humans; allowing the movement of people and goods, supporting production and becoming the gate to expansion. Nevertheless, transportation was argued a significant contributor to environmental degradation, global warming and excessive consumption of energy; accelerating the rise of Sustainable Transportation (ST), as an integral part of the sustainable development movement. Drafts of ST were sketched, guiding principles were argued and rating systems were pursued. The issue was to minimize the impacts of unsustainable trends and make the globe a better place to live in.

In the last decades, the majority of consideration was oriented towards newer districts rather than older ones. Gharb El-Balad District (GEBD), as the historical city center of Assiut, Egypt, can be considered self-evidence. Existing deficiencies of its street network coupled with the rising unsustainable trends provided the research with an influential motive. In this paper, the GEBD street network was developed; moving a step towards sustainability. Key-attributes of ST were derived, strategic directions were proposed, possibilities of application were studied, appropriate actions were proposed and a development plan was worked out.

1. Introduction:

1.1 Motivation: Why sustainable transportation? *And* Why Gharb El-Balad District?

Historically, the concepts of sustainable transportation were developed before the phrase was coined. Many writings pointed to, and further documented, the dominance of car-based transportation; highlighting its impacts on people. Urban transportation systems were then argued to become unsustainable; consuming energy, affecting the health of population and negatively influencing policy-making, practice and performance ('Sustainable Transport', 2009). Extensively, the reduced people's capacity to use resources in a sustainable manner in the developing countries and the rapid exploitation of resources in the developed countries have revealed massive environmental pollution and degradation; depicting an added dimension to unsustainable development in general and to transportation systems in particular (Blowers, 1993; and Ali, 2006).

These transformations had the potential to accelerate the rise of sustainable transportation, as an integral part of the sustainable development movement. The issue was to save energy, minimize the instability of fossil fuel, limit emissions, reduce noise, protect the local and global ecology, maintain human health, support safety, create economic vitality and pursue social equity ('Sustainable Transportation Vision', 2006; and 'Why sustainable choices are smart', 2009). To achieve these attributes, drafts of sustainable transportation were sketched, guiding principles were proposed, checklists were pursued, rating systems were developed, and assessment methods were worked out. The proposal of 'Environmentally Sustainable Transportation (EST)' done by the Organization for Economic Cooperation and Development (OECD), as a leading organization, followed by the efforts of Curitiba, Brazil, Bogota, Colombia Portland, Oregon and Vancouver can be considered self-evidence ('Towards Sustainable Transportation', 1996). These efforts varied in nature, scope and influence due to the varying conditions between and within countries and cities; versifying the way sustainability in transportation can be achieved, raising the environmental awareness, promoting responsible bodies to take appropriate actions and opening the door on sustainable transportation in a broader context.

As a case study, Gharb El-Balad District (GEBD), the historical city center of Assiut, announced itself for many reasons. At the top of the rational motives come the historical, social and cultural values of the district, as the nucleus of Assiut City and one of the ancient parts of it. However, recent developments

were oriented toward newer districts; where the rich and well educated people live, while the GEBD, where the poor(1) and the illiterate live, laid far beyond policy makers' interest and awareness. Further, the district, with a density of about 440 P/Acre, was argued overpopulated and overcrowded, being marked by the shortage in major services and facilities (Tarshan, 2007).

Despite the deteriorated profile of the GEBD, its compact urban form, well inter-connected street network, high percentage of deteriorated buildings (28%) that can be rebuilt according to a well prepared plan, the rising commercial investments (22.9% mixed land use mostly commercial in addition to 3.3% pure commercial) and the adjacency to Assiut City future land extensions represented positive indicators of the GEBD urban capabilities (Tarshan, 2007). These capabilities together with the complexity and contradictions of the GEBD urban profile strongly promoted the district to be the case study of this research.

1.2. Aim, Objectives and Research Methodology:

Rationally reacting to its pressing urban profile, the GEBD street network was promoted to be developed. The aim was to give it an opportunity to experience a level of, and further support, sustainability in relation to transportation. For the aim to be attained, the following objectives were to be accomplished:

- Investigating the complexity of sustainability in transportation and deriving its key-attributes.
- Identifying the strategic directions to sustainable transportation.
- Studying the possibility to apply these directions to the case study; proposing actions and sketching the strategic plan of development.

To achieve the stated objectives, a seven-step research methodology was proposed, fig. (1). According to this methodology, a literature review is to be conducted; building the research theoretical background and addressing the previous experiences needed to manage it. Further, strategic directions to achieve sustainability in relation to transportation are to be identified, and possibilities of applying these directions to the GEBD, in the light of its local context, are to be studies. To evaluate the development strategic plan, a checklist is to be made prior to detailed design and application.

(1) More than 80% of GEBD population have a monthly income less than 250 L.E. compared with the national average income of 737.3 L.E.

2.Sustainable Transportation: Definitions, Guiding Principles, Checklists and Rating Systems

2.1. Definitions and Guiding Principles:

The term sustainable development was introduced in 1980 and popularized in the 1987 report of the World Commission on Environment and Development; being defined as the *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (Kågeson, 1994). Since its emergence, sustainable development has been considered an umbrella term; having the potential to accelerate the rise of other movements as integral parts of it. However, the essential attributes of sustainable transportation were celebrated within three kinds of definitions: the literal economist's definition, the environmental definition and the comprehensive definition (OECD Guidelines, 2002).

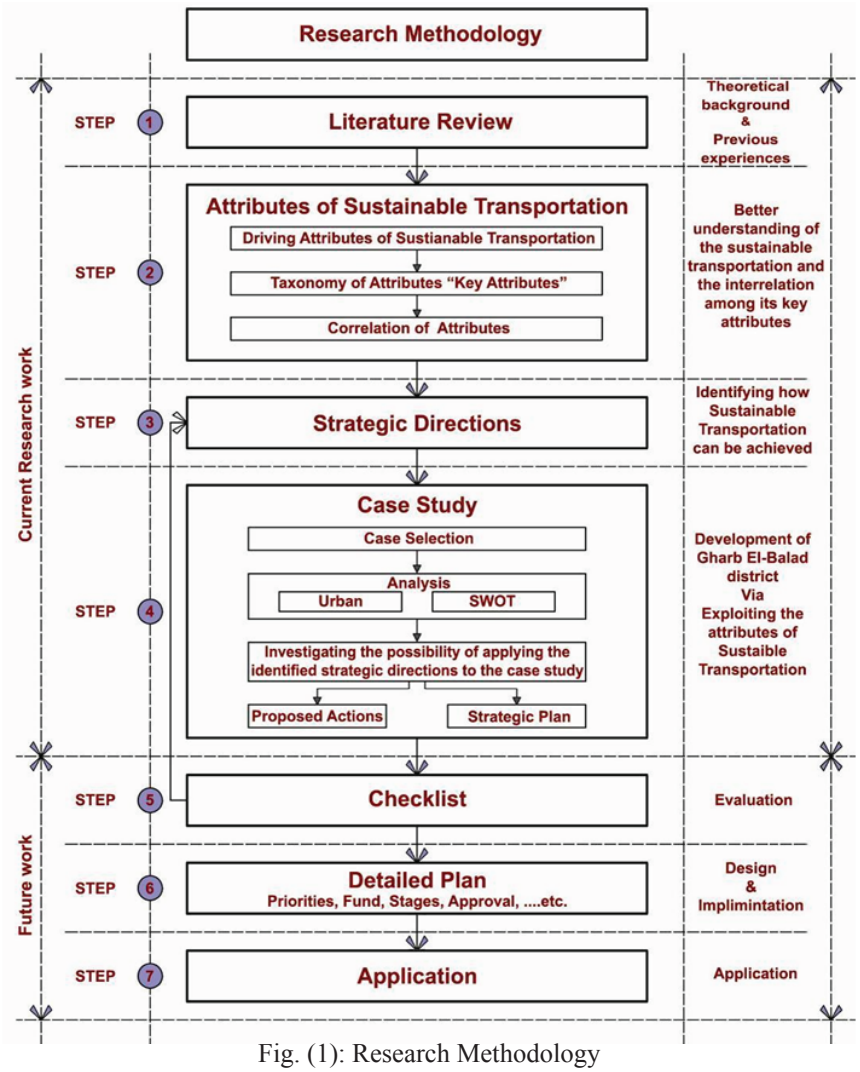


Fig. (1): Research Methodology

As for the literal economist's definition, Nelson and Shakow (1996) proposed that sustainable transportation *"is achieved when the total future discounted per-capita social costs ...related to the transport system are equal to or less than the costs in a selected reference year"*. In other words, Schipper (1996) argued that sustainable transportation can be achieved when *«the beneficiaries pay their full social costs, including those paid by future generations».*

The second kind of definitions concerned Environmentally Sustainable Transportation (EST). The Organization for Economic Cooperation and Development (OECD) defined environmentally sustainable transportation system as the one that *«does not endanger public health or ecosystems and meets needs for access consistent with (a) use of renewable resources at below their rates of regeneration, and (b) use of non-renewable resources at below the rates of development of renewable substitutes»* (OECD Guidelines, 2002).

According to the comprehensive definition, a sustainable transportation system is *«the one that; (a) allows the basic access and development needs of individuals, companies and societies to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations; (b) is affordable, operates fairly and efficiently, offers choice of transport mode, and supports a competitive economy, as well as balanced regional development; (c) limits emissions and waste within the planet>s ability to absorb them, uses renewable resources at or below their rates of generation, and, uses nonrenewable resources at or below the rates of development of renewable substitutes while minimizing the impact on the use of land and the generation of noise»* (OECD Guidelines, 2002).

Adopting the stated attributes, guiding principles to achieve sustainability in transportation were sketched, and checklists and rating systems were developed. Due to the varying environmental, social and economic conditions between and within countries, the OECD argued that there is no single best way to achieve sustainable transportation; proposing a set of guiding principles upon which transition strategies can be built. In Vancouver, B.C., the OECD Conference, which held in 1996, revised, amended and further developed a set of draft principles proposed by Canada`s National Round Table on the Environment and the Economy (NRTEE). The guiding principles were: (1) reasonable access to other people, places, goods and services; (2) social, interregional and inter-generational equity; meeting transportation related needs of all people; (3) encouraging individuals to make sustainable choices with regard to personal movement and consumption; (4) protecting health, supporting safety and enhancing the quality of life; (5) engaging people in the decision-making

process; (6) more integrated approaches to planning; (7) efficient use of land and other natural resources via sustainable transportation; (8) pollution prevention; and (9) contributing to improvements in economic and community well-being (<Towards Sustainable Transportation>, 1996).

Further, a number of strategic directions were proposed to move towards sustainability; responding to more than one of the outlined guiding principles. For the attainment of EST in the target year of 2030, the OECD paper set out six criteria concerning transportation-related emissions of nitrogen oxides, emissions of volatile organic compounds, climate change prevention, emissions of particulates, land surface use and maintenance, and noise reduction. Based on these criteria, four scenarios to achieve sustainable transportation for 2030 were established: a business-as-usual (BAU) scenario (the reference scenario), the high-technology scenario (EST1), the capacity-constraint scenario (EST2), and the optimum-combination scenario (EST3); which implied a combination of technological change and demand management (Towards Sustainable Transportation, 1996).

2.2. Checklists and Rating systems:

In the light of these guiding principles, individuals and institutions started to develop checklists and rating systems in order to be used in evaluating and developing transportation systems. As an example, Ian Taylor & Lynn Sloman (2008) developed their Sustainable Transport Masterplanning Checklist in 2008; identifying eight key issues to achieve sustainable transportation. These issues were: location of new developments, density of development, local facilities and jobs, street layout and design, public transportation, parking, restraint to car movement and smart travel behavior. According to the checklist, encouraging walking and cycling, adjacency to facilities, centers and services, more dependence on public transportation, restricted car movement and restricted parking can be considered the most significant attributes and strategic directions to sustainable transportation.

Further, the pilot version of the Leadership in Energy and Environmental Design (LEED) rating system for Neighborhood Development (LEED-ND) and its rating system for New Constructions (LEED-NC) Version 2.2 concerning transportation can be considered the most famous and widely accepted rating systems. To support sustainable transportation, the LEED-NC assigned a Credit No 4: <Alternative Transportation> (4 points from 69 points); highlighting the importance of: public transportation access (1 point), bicycle storage and changing rooms (1 point), low emitting and fuel efficient vehicles (1 point) and parking capacities (1 point) (LEED, 2005).

To develop existing neighborhoods, the LEED-ND assigned two groups of credits to support sustainability in relation to transportation: <Smart Location and Linkage> and <Neighborhood Pattern and Design> (a total of 26 points from 106 points). Smart Location and Linkage (SLL) included: Credit 4: reduce automobile dependence (8 points) and Credit 5: bicycle network (1 point), while Neighborhood Pattern and Design (NPD) included: Credit 6: reduced parking footprint (2 points), Credit 7: walkable streets (8 points), Credit 8: street network (2 points), Credit 10: transportation demand management (2 points), Credit 11: access to surrounding vicinity (1 point), Credit 12: access to public Spaces (1 point), and Credit 13: access to active Public Spaces (1 point) (LEED, 2007).

3. Towards Sustainable Transportation: Key-Attributes and Strategic Directions

3.1. Key-Attributes of Sustainable Transportation:

In investigating the complexity of ST, dozens of definitions and proposals appeared to announce themselves, showing the term easy to use but hard to precisely exploit as a detailed guidance for detailed design. Rationally reacting to that, a wide range of ST attributes were derived from the related literature, put under one roof, analyzed and categorized to fall into 11 interrelated groups; 11 key-attributes, fig. (2). In terms of supporting accessibility, people, goods, vicinity, public transportation, services, public spaces and active social spaces are to be easily accessed through inter-connected street network. Walking, cycling and public transportation are to be encouraged and safety of pedestrians are to be supported. As a result, transportation demands in general and dependence on automobile in particular are strongly promoted to be minimized. Further, more parking capacities to support inter-connectivity and parking management to reduce its footprint are emphasized. The issue is to reduce emissions, prevent pollution, lower consumption rates and support the economic progress, health & ecosystem and the social equity.

3-2 Interrelationships of Sustainable Transportation Key-Attributes: In-Depth Analysis

In analyzing the derived attributes of ST and identifying their interrelationships, an in-depth analysis was conducted. The attributes were argued to be correlated according to seven types of relationships: two-way strong correlation, one-way strong correlation, two-way weak correlation, one-way weak correlation, weak negative correlation and strong negative correlation. As presented in fig. (2),

these seven correlation types were assigned values of +4, +3, +2, +1, -1 and -3; referring to the strength and type of relationships, respectively. Further, the overall correlation value of each attribute were determined showing how far this attribute would influence and be influenced by other attributes, fig. (3).

As shown in fig. (4), the attribute of sustainable choices, with a correlation value of 78 points, announced itself as a mother-attribute; having one-way strong correlations with all other attributes. After sustainable choices came less dependence on automobile with a correlation value of 60 points; showing its potential to support sustainability and being supported by the encouragement of public transportation (a correlation value of 53 points). In another context, pollution prevention, reduced emissions and reduced consumption were shown

Accessibility	Access to goods	Access to active social spaces	Access to public	Access to people
	Access to services	Access to public transportation	spaces Access to vicinity	Inter-connectivity through street network
Cycling	More dependence on cycling	Safe cycling		
Walkability	Pedestrian safety	Encouraging walkability		
Less Automobile	Reduce automobile dependence			
Demand Management	Less transportation demands			
Less Pollution	Pollution prevention	Reduced emissions		
Economic Value	Reduced consumption	Economic progress		
Health & Ecosystem	Public health & ecosystem			
Social Equity	Less dependence on the non-renewable	Sustainable choices	Sharing the environmental cost	Exploiting renewable resources
Parking	More parking capacities	Reduced parking footprint	Parking management	
Public Transportation	More dependence on public transportation			

Fig. (2): Key-Attributes of Sustainable Transportation

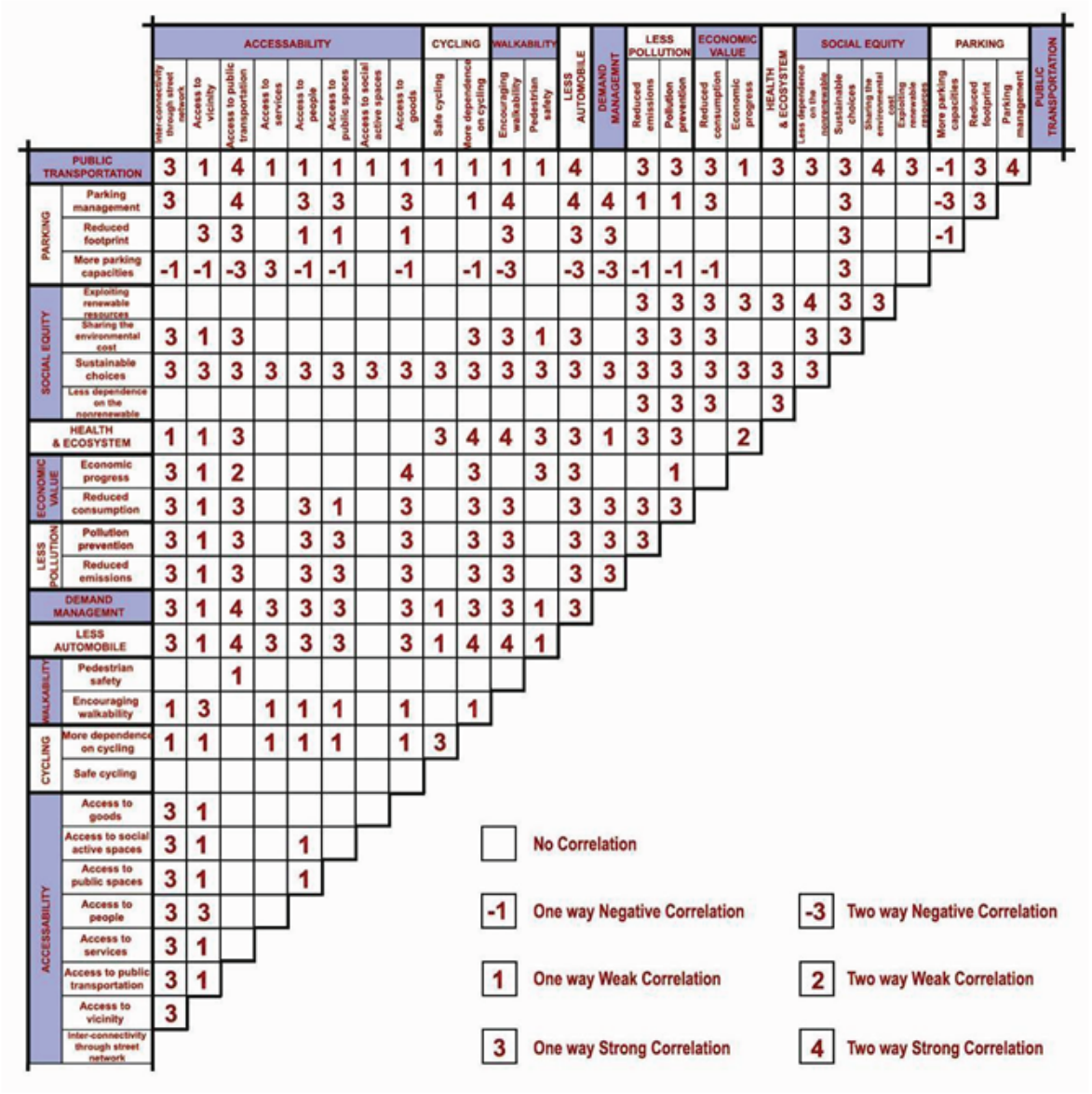


Fig. (3): Correlations of Sustainable Transportation Key-Attributes

to have relatively high correlation values; 53, 52 and 49 points respectively, emphasizing the environmental responsibility as a vital issue. Inter-connectivity (52 points) followed by the demand management (48 points) were seen to have strong correlations with other attributes. Despite encouraging walkability and dependence on cycling (each of 40 points) appeared to strongly support other attributes, pedestrian safety (14 points) and safe cycling (17 points) lagged behind. Further, accessibility related attributes had a wide range of correlation values; ranging from 41 points (access to public transportation) downwards to 9 points (access to active social spaces). Despite the attribute of more parking capacities was claimed to support accessibility, it had negative correlations with most attributes (-21 points).

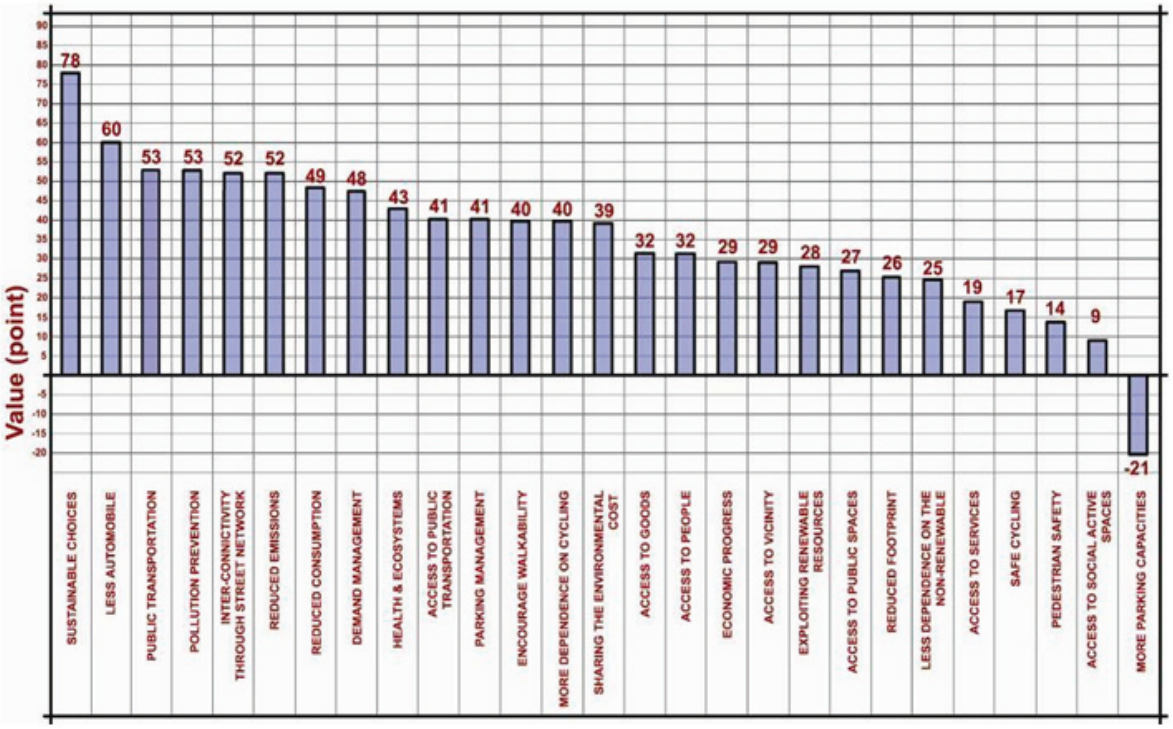


Fig. (4): Correlation Values of Key-Attributes

3.3. Strategic Directions to Sustainable Transportation:

In order to move a step towards ST, a number of strategic directions to achieve its derived 11 key-attributes were proposed. As shown in fig. (5), each direction appears to support more than one key-attribute. For instance, compact urban form, as a strategic direction, is to support accessibility, encourage walking and cycling, promote less dependence on the car and consequently contribute to pollution prevention.

4. Case Study: Street Network in Gharb El-Balad District

The GEBD can be considered one of the oldest districts in Assiut City, located in western south Assiut City, fig. (6), with an area of 508036.07 m2, population of 53335 capita and density of about 440 P/Acre (Tarshan, 2007). In this part of the paper, the local context of the GEBD was introduced and analyzed, as a step to study the possibility of applying the previously stated ST strategic directions. First, the urban profile was briefly introduced to be followed by a SWOT analysis of the GEBD street network. Based on that, an integrated profile to develop the network was presented; proposing actions and arguing a strategic plan.

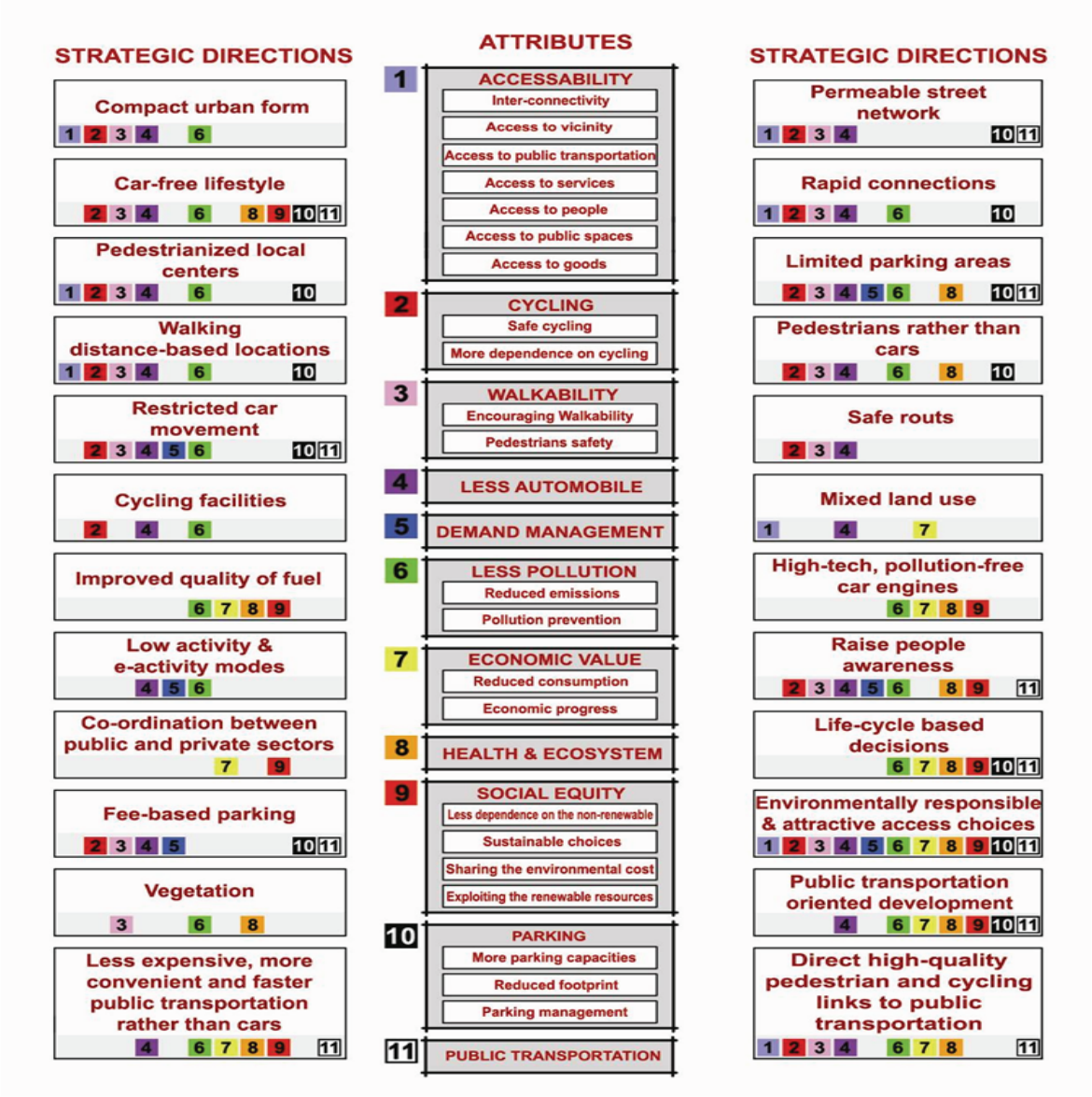


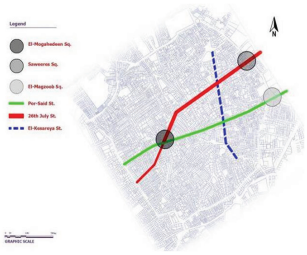
Fig. (5): Strategic Directions to Sustainable Transportation

Fig. (6): Location of Gharb El-Balad District in Assiut City

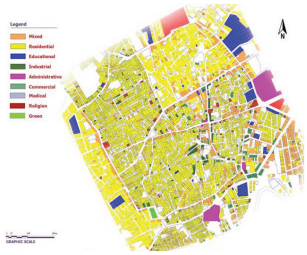
4.1. Urban Analysis:

As shown in fig. (7), three nodes; El-Mogahedeen Sq., Saweeres Sq. and El-Magzoob Sq. (the key-gate to the district) and three main paths; Por-Said St., the 26th July St. and El-Kesarya St. (Pedestrians only) form in their totality the basic features of the GEBD street network mental image. Further, the district is clearly seen of a compact urban form, within which the street network is well inter-connected; evidenced by the high percentage of public spaces (26% mostly streets).

Since main streets are paved and most walkways are occupied by illegal commercial activities, the car movement takes the priority over pedestrians and cycle riders. Due to the high population, the GEBD can be considered an over-populated and over-crowded district, marked by mixed land use and dominance of commercial activities; especially alongside arterial roads (Tarshan, 2007). Further, the district is marked by the shortage in services and facilities and a high percentage of deteriorated buildings (28% and most of them made of mud bricks), notably reflecting the deteriorated urban profile of the GEBD.



(7-a) Nodes and Paths



(7-b) Land Use

(7-c) Heights

(7-d) Building Cases

(7-e) Public Spaces

(7-f) Street Network

Fig. (7): Urban Analysis of Gharb El-Balad District

4.2. Street Network: SWOT Analysis

To come closer to the aim of the study, a SWOT analysis of the GEBD street network was conducted in order to identify: the attributes that would help moving towards ST (Strengths), the attributes that would hinder that (Weaknesses), helpful external conditions (Opportunities) and harmful external conditions (Threats), table (1).

Table (1): SWOT Analysis of the GEBD Street Network

STRENGTHS	WEAKNESSES
• Legible mental image. • Compact urban form and permeable street network support inter-connectivity. • Main streets (arterial roads and collectors) are well paved, and the infrastructure is installed. • High percentage of public spaces (26%) supports proposing street network design alternatives. • The 26th July St., the main arterial road, of 15m width allows 2-way car movement and supports public transportation. • Private cars ownership is at minimal rates (0.006 private car/capita) when compared with the national average rate of 0.023%[1]. • Low income rates do not allow people to own private cars, encouraging walking, cycling and public transportation.	• Widths of street network do not enable safe walkways and cycling routs; mixed movement threats the safety of people (pedestrians and cycle riders). • Car movement takes the priority over walking and cycling. • No public transportation (dependence on taxis) • No central parking areas (parking takes place alongside street network). • Lack of services and facilities. • Lack of vegetation. • Due to high illiteracy rate, the issue of sharing the environmental responsibility and raising public awareness concerning ST strategic directions can be considered academic. • High rates of emissions due to deteriorated car engines owned by residents.
OPPORTUNITIES	**THREATS**
• The district is attached to Assiut City future land extensions; therefore, these extensions can be accessed through the GEBD.	• Low degree of governmental awareness. • Absence of NGOs and public participation. • Lack of funding resources.

4.3. An Integrated Profile to Develop the GEBD Street Network

4.3.1. Proposed Actions:

To achieve sustainability in transportation; in terms of supporting its 11 key-attributes, 24 strategic directions were pursued, fig. (5). In developing the GEBD street network, these directions appeared to fall into three groups. The first group of strategic directions seemed to have no beneficial use for the development

of the GEBD street network for many reasons. Directions of <compact urban form>, <permeable street network>, <walking distance locations> and <rapid connections> would not help since the urban form is already compacted and the existing street network is well inter-connected; promoting rapid connections and supporting accessibility to the <mixed land use>. Due to the low car-ownership rate of 0.006 car/capita, the notion of <car-free life style> seems academic.

On the further side of the research scope resides the second group of strategic directions including: <improving the quality of fuel>, <high-tech, pollution-free car engines>, <low activity and e-activity modes>, <raise people awareness>, <co-ordination between public and private sectors>, <life-cycle based decisions>, <fee-based parking> and <less expensive, more convenient & faster public transportation rather than cars>, to be the issue of industrial, social and governmental bodies. In contrary to the first and second groups of strategic directions, the third group appeared to have the outward aspect of supporting ST fitting within the scope of the research, offering opportunities, proposing actions and sketching the main features of the development strategic plan. As briefly presented in table (2), the proposed actions to achieve ST in the GEBD, in view of these strategic directions, were pursued.

4.3.2. Development Strategic Plan:

In this part of the paper the proposed actions; which were argued in view of ST attributes, were put together under one roof and analyzed with correspondence to the GEBD local context to form in their totality the proposed development strategic plan, fig. (8). The development plan can be summarized as follows:

• A public transportation network was proposed to take the priority over private car and taxi-based movement (a Mini-bus station and eight Mini-bus stops).

• To support walkability, the local center, where most commercial activities take place, was pedestrianized with emergency access and serving routes.

• Existing street network was redesigned to minimize car movement, encourage walking and cycling and support pedestrians' safety.

• Five fee-based central parking areas were proposed to cover the GEBD in order to minimize the transportation demand, reduce parking footprint and encourage walking, cycling and dependence on public transportation.

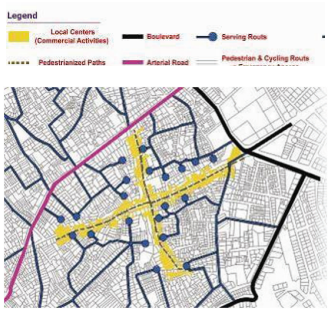
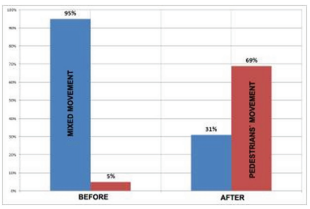
• To support cycling, storages and facilities were installed attached to Mini-bus Station and stops.

• Adopting the green street concept, vegetation was proposed alongside the

public transportation spine and close to Mini-bus stops to minimize the impact of fuel emissions.

•Being influenced by the social and cultural values of the GEBD, as the historical center of Assiut City, the proposed actions appeared to take the mental image (i.e. piazzas, nodes, paths, compact pattern) of the district into consideration.

Table (2): Proposed Actions

Strategic Directions	Proposed Actions	Maps & Illustrations
Pedestrianzed Local Centers	• In Por-Said St. and El-Kesarya St. (local center), movement is limited to pedestrians with emergency access. As shown in the map, the commercial activities are served by dead-end serving routs (cul-de-sac routs).	
Restricted Car Movement Pedestrians Rather than Cars Safe Routs	• Car movement in the local center is already restricted according to the previously proposed action. • To promote the priority of pedestrians over car movement, the street network is refined in terms of assigning only 31% of the network for mixed movement (instead of 95%), while 69% of the network is limited to pedestrians, cycle riders and emergency access (compared with 5% before refinement). The issue is to reassign priorities and support safety. • Pedestrians' primary flow runs along Por-Said St. and El-Kesarya St. in the center of GEBD supporting pedestrians' safety, while pedestrians' secondary flow moves alongside street network feeding the entire district.	  
Limited Parking Areas	• Five locations are argued to have the urban capabilities (within walking distance to the local center, commercial activities, key locations, key-gateways and piazzas) to be exploited as central parking areas. • These locations are proposed to be fee-based, minimizing transportation demands and encouraging walking and cycling.	 

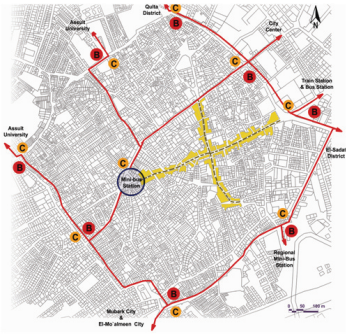
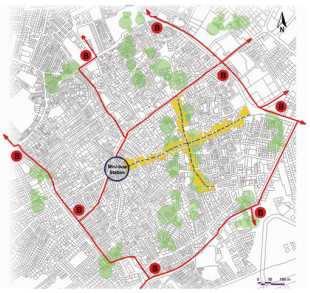
Public Transportation Oriented Development Direct High-Quality Pedestrian and Cycling Links to Public Transportation Cycling Facilities	• Public transportation network is developed, serving the entire district, supporting connectivity, strengthening the connections to vicinity and taking the priority over private car and taxi-based transportation. • The Mini-bus Station is located in El-Mogahedeen Sq. in the GEBD key-location. • Eight Mini-bus stops are proposed in order to cover the entire district within a maximum walking distance of 300 m. • Mini-bus stops are located alongside arterial roads and main streets to support direct pedestrian and cycling links to public transportation. • Cycling storages and facilities are installed; attached to Mini-bus Station and stops.	   
Vegetation	• Green street concept is adopted, and vegetation is proposed alongside the public transportation main path and close to Mini-bus stops. The issue is to minimize the impact of fuel emissions.	 
Environmentally Responsible And Attractive Access Choices	• An end to dominance of mixed movement type of the existing street network is proposed; pursuing various movement types and attractive accessibility choices.	

Fig. (8): Strategic Plan of GEBD Street Network

5. Discussion: Results and Research Attainments

• In this paper, it was earlier argued that due to the varying environmental, social and economic conditions between and within countries there would be no single best way to achieve ST; opening the door on local efforts to integrate theoretical guiding principles closely together with the pressing local context; adopting the concept of *'think globally and act locally'*. The scope of the paper was extended to provide a strategic plan to develop the GEBD, while plan evaluation, design & implementation and application remain the issue of future work.

• The paper managed to induce a taxonomy of ST attributes, as they were derived from the literature, to fall into 11 key-attributes, which can be considered a concrete base on which a coherent profile of ST can be sketched.

• The paper argued that achieving one attribute of ST would influence and be influenced by achieving other attributes, providing the paper with the motive to induct an in-depth analysis in order to identify the interrelationships among ST attributes.

• The in-depth analysis showed ST attributes to have various relative weights due to the various correlation values (from +78 to -21) they have.

• The analysis showed that more dependence on public transportation together with restricted car movement can be considered the most influential strategic direction to support achieving ST. On the contrary, the excessive parking areas are to maximize transportation demand; negatively influencing the achievement of ST.

• The paper managed to issue 24 strategic directions to achieve ST.

• After analyzing the GBED profile (urban analysis & street network SWOT analysis), the strategic directions to ST were integrated with the local context providing the research with solid ground on which appropriate actions were proposed and a strategic plan was developed.

6. Conclusion:

In this paper, the GEBD was given the opportunity to experience a level of sustainability in transportation, based on an overall urban analysis as well as a SWOT analysis of its street network. ST theoretical perspectives and guiding principles were closely integrated together with the pressing local context of the GEBD; adopting the concept of *'think globally and act locally'*. As a result, a development strategic plan was proposed based on studying the application possibilities of 24 ST strategic directions. In conclusion, the research appeared to bridge the gap between theory and practice in terms of investigating the potentials of ST as a theoretical issue, to develop an existing district with a relatively pressing local profile.

References:

1. Ali, Khaled (2006) 'Intelligent Architecture: Contemporary Refining of Local Architecture', Ph.D. Thesis. Egypt: Assiut University.

2. Blowers, Andrew (1993) 'The Time for Change', in: Blowers, Andrew (1993) 'Planning for Sustainable Environment'. London: Earthscan Publications Ltd.

3. Kågeson, Per (1994) 'The Concept of Sustainable Transport, European Federation for Transport and the Environment', Belgium: Brussels.

4. LEED (2005) 'Green Building Rating System for New Construction & Major Renovations', Version. 2.2. US: Green Building Council.

5. LEED (2007) 'LEED for Neighborhood Development Rating System', Pilot Version. US: Green Building Council.

6. Nelson, Dick & Shakow, Don (1996) 'Sustainable Transportation Through an Integrated Planning Process'. OECD Proceedings. Canada: The Vancouver Conference. Cited in: http://www.globaltelematics.com/lcp/nel3.htm (1st March 2009).

7.OECD Guidelines (2002) "Towards Environmentally Sustainable Transportation". France: Organization for Economic Co-operation and Development.

8. Schipper, Lee (1996) 'Sustainable Transport: What It is, and Whether It Is'. OECD Proceedings. Canada: The Vancouver Conference.

9. 'Sustainable Transport' (2009), Article in Wekipedia. Cited in: http://en.wikipedia.org/wiki/Sustainable_transportation (1st March 2009).

10. 'Sustainable Transportation Vision' (2006). WA: Western Washington University.

11. Tarshan, Moataz (2007) "Re-qualification of Urban Heritage in the Developing Countries- Case Study of the Historical City Center, Assiut City, Egypt", M.Sc. thesis. Rome: University of Rome (La-Spianze).

12. Taylor, Ian & Sloman, Lynn (2008) 'Masterplanning Checklist for Sustainable Transport in New Development'. London: London Council.

13. 'Towards Sustainable Transportation' (1996), OECD Proceedings. Canada: The Vancouver Conference.

14. 'Why sustainable choices are smart' (2009). Canada: BC Climate Action Toolkit. Cited in: http://www.toolkit.bc.ca/solution-rationale/why-sustainable-transportation-choices-are-smart (1st March 2009).

تطوير شبكة الشوارع بمنطقة غرب البلد بمدينة أسيوط نحو النقل المستدام

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الملخص:

يعتبر النقل من أهم ضروريات الحياة بما يكفله من تيسير حركة البشر وتأمين احتياجاتهم اليومية ودعم الانتاج. ومع ذلك تشير الدراسات إلى أن النقل ذاته يعد من أهم المؤثرات التي تؤدي إلى التدهور البيئي وتلوث الهواء وتنامي معدلات استهلاك الطاقة وتراجع مؤشرات الصحة، الأمر الذي أدى إلى ظهور أطروحات ما تم تسميته بالنقل المستدام كجزء لا يتجزأ عن التوجه العالمي نحو التنمية المستدامة. وانطلاقاً من هذا الطرح تم صياغة عدد من الأسس النظرية والمبادئ العامة التي تتبني المفهوم وتكفل له الدعم ، وكذا عدد من قوائم المراجعة وأدلة التقييم التي يمكن من خلالها تقويم شبكة الحركة في ضوء أطروحات النقل المستدام بهدف الحد من الأنماط التنموية غير المستدامة.

وفي الآونة الأخيرة، حظيت الأحياء والمجاورات والمستقرات الجديدة بوجودها في دائرة اهتمام المسئولين ومتخذي القرار في حين قبعت الأحياء القديمة والمناطق التاريخية بعيداً عن دائرة الضوء، لتزداد الفجوة بينها وبين نظرائها الأحدث. وانفعالاً من الورقة البحثية بهذا التباين ورغبةً من فريق العمل في تبني ودراسة إمكانية تطبيق مفاهيم وأطروحات النقل المستدام، تم اختيار منطقة غرب البلد باعتباره المركز التاريخي لمدينة أسيوط والنواة القديمة لها كحالة للدراسة. وفي هذه الورقة تم دراسة إمكانية تطوير شبكة الشوارع بمنطقة غرب البلد في ضوء أطروحات النقل المستدام والتوجهات الاستراتيجية لتحقيق هذه الأطروحات، لتنتهي الدراسة بالتوصل إلى خطة متكاملة للتطوير.