

Developing countries challenges in applying sustainable urban development: An application on Egypt

Sherine El Sakka

Future University in Egypt, Egypt

Department of Management, School of Business

Key words

Sustainable urban development (SUD), environmental sustainability (ES), sustainability of developing cities (SDC).

Abstract

Sustainable urban development (SUD) is influenced by social, cultural, economic and environmental sustainability (ES) of developing and developed countries. Our paper will focus on the challenges confront the developing countries in sustainable urban development an application will be on Egypt, which will clarify current situation and future challenge will assess the impact of sustainable development on developing country to propose some possible directions for the future .A new solution of improving sustainability of developing cities (SDC) should be found.

1. Introduction

Changing urban development from its present unsustainable form is a very challenging process, not urban form only but transportation system, water, waste and energy, technologies as well have to be changed, the value systems and the process of urban governance planning, need to reflect a sustainable agenda.

2.1 Literature Review

2.1 Sustainability

According to the United Nations World Commission on Environment and Development (The Brundtland Commission) report, sustainability is defined as the ability to create development that meet the needs of the present generation without compromising the ability of future generations to meet their own needs “the ability to sustain life at the current quality for the generations that come after ours (1987:43).

In general, sustainability is the ability to maintain balance of a certain process or state in any system, sustainability in this context relates to the ability of the environment to meet the basic requirements for the sustenance of the living and nonliving components of the ecological, economic and socio cultural systems in a manner that does not limit the possibility of meeting the present and the future needs of the various components and aspects of the environment.

1. 2-Sustainable Development

According the Rio Declaration on Environment and Development Agenda 21 in 1992, sustainable development became a global strategy for planning professionals, architects and development officials to address human developments effects on the environmental crisis. Sustainable Development, need to ensure diversification of local economies through building on exciting economic activities. It needs also to provide a better distribution of benefits through building on activities as it builds on traditional social and economic activities to provide fair benefit distribution (Fuller Bultjens and Cummings 2005) The Earth Summit (UNCED) , which took place in Rio de Janeiro in 1992, recognized how environment and development problems

are pressing, **Agenda 21** produced a global programme of action for sustainable development it stresses the importance of improving social, economic and environmental quality in urban areas, it focused on environmental infrastructure, water, sanitation, transportation and solid waste management, the earth summit broadened environmental issues with other social and economic policy issues. **The World Summit for Sustainable Development (WSSD)**, held in August 2002, urged in its plan of implementation that nations should take steps to make progress in the formulation and elaboration of national strategies for sustainable development and begin their implementation (UNDESA, 2004).

Building Sustainable Environment Requires investment in

1. Renewable energy resources.
2. Efficiency in the use of water and electricity.
3. Design and implementation of compact cities.
4. Increase green area.
5. Reliable, affordable and fast public transportation.
6. Waste management collection and recycling systems.

Sustainable development as applied to urban areas is the ability of the urban area and their regions to continue function at levels of desired quality of life without limiting the options available to the present and future generations, to adverse impacts within and outside their boundaries, the ecological and sociological footprint of cities has spread over ever wider area and the fewer places on the planet earth are unaffected by this phenomenon, changes in the ecology of urban environment occasioned by increasing population, overcrowded habitations and uncontrolled exploitation of natural sources may account for this wide ecological footprint of urban area which is not peculiar to developing countries.

2.3 Urban Sustainability

Urban sustainability is the process of developing and redeveloping urban areas in a way that will improve the urban environment, economy and promote equity or social justice, urban sustainability is the future goal of urban sustainable development. (Martino 2009). We need to be aware not only of the ways in which social, economic, and environmental conservation can enable economic development which in turn can contribute to greater efforts in the field of environmental management. Sustainability goals can be reached by economic and governmental reform and new policy ideas like smart growth, urban growth boundaries. Many of the advocates of sustainability base their assumptions on a very pessimistic view of the world, they assume that the resources of today will be the resources of tomorrow and that human will be unable to discover new ones. (Bruegman 2005:148). During the Urban 21 Conference (Berlin, July 2000) they defined the sustainable urban development by improving the quality of life in a city, including ecological, cultural, political, institutional, social and economic components without leaving a burden on the future generations, a burden which is the result of a reduced natural capital and an excessive local debt.

3. Sustainable Development Different Aspects

3.1 Environmental Degradation

Due to technology changes the environment is affected, thus leading to pollution and depletion of resources. Technological effects refer to changing production methods following changes in economic policies. Pollution emissions are affected by demand for environmental quality, new technologies and national environmental standards. Environmental degradation will occur due to population pressures. However, there may also be a negative relationship

between technology and sustainable development as certain patterns of growth and technological progress deplete natural resources more rapidly than others.

3.2 Sustainable Human Development

Sustainability in this aspect refers to the provision of sustainable livelihoods for the current and Future generations. The concept of sustainable human development is concerned with poverty alleviation through employment generation and improvement in human well-being. Cities are sustainable through resilient buildings, alternative transportation system, renewable energy systems, water sensitive design and zero waste system.

4. Sustainable Development Criteria

The challenges raised by the imperative of sustainable development will be different for urban planning in poor developing countries than in other wealthy regions of the world , whereas improvement of the residential and hygienic standard will be among the main tasks of a sustainable urban planning, also it must secure that the inhabitants of the area can have their vital needs met in a way that can be sustained in the future and is not in conflict with sustainable development at a global level. A sustainable level of energy use and emissions in European countries must consider both a goal of reducing the global energy use and related emissions, and a goal of increasing the material standard of living in developing countries, the global carbon dioxide must be reduced at least 60 %some of this reduction could be obtained by shifting to other energy sources than oil. In some countries, including Norway, Great Britain and Germany, they focused of the negative environmental consequences of a land consuming and sprawling urban development, loss of natural resources and high energy use for transport and in buildings. In Denmark and partly in Sweden, the discussion has been focused on the possibility of establishing ecological cycles of water and sewage within the separate neighborhood or even at the individual site. The compact cities model implies that future needs for development should primarily be met.

5. Urban Sustainability in Developing Countries

People who live in urban areas have basically different consumption customs than people living in the country side, urban populations consume much more food, energy and durable goods than rural populations which will affect the environment in order to achieve sustainable development for the world its crucial to understand that the care for the environment it's not only for the developed rich countries but its imperatives for developing countries as well developing countries are attracting foreign direct investment associated with urban development, developing countries must be investment friendly by processing land , capital and a cheap, productive labour force. Urban environmental issues should continue to dominate the sustainable agenda in developing countries in the next few decades.

5.1 The Policies should be taken by Developing Governments to help their Cities to move Toward Sustainability.

- Improve infrastructure to enable energy, water, transport and waste to be managed with minimal ecological impact.
- Adopting innovation to ensure that latest Eco technology becomes mainstream.
- Applying tax incentives to direct investment into these new technologies.
- Applying regulations to set the standards high enough for sustainability technologies.
- Regulations alone cannot change behavior, without education and awareness policy approaches will be wasted, lifestyle should be changed , when people start to change their lifestyles and see the difference they become advocates of sustainable transport

policies for example they will start to talk with their friends about how they feel better after bicycling, walking or taking the bus or train instead of driving , they will be happy of how much money they saves and how they feel that they contributes in climate changes. In order to make urban development more in line with the requirements of sustainable development, it seems important to avoid further urban sprawl and expansion of the road and parking capacity , instead , most construction should take place within existing built-up boundaries , in particular in areas not far from the urban center , most of the densification should be channeled to areas already technically affected in order to save urban green areas , restriction should be put on the use of cars , while improving public transportation. Urban greening is an important tool for sustainability; some city greening efforts are achieving environmental results and reducing city costs to provide essential infra-structure. These efforts sometimes face implementation barriers, a lack of clear developed measures of natural system benefits, bureaucracies of some agencies, weakness of government jurisdictions and coordination difficulties.

5.2 Sustainability Challenges and Urban Development in Egypt. The most serious problems confronting developing countries and their inhabitants are lack of financial resources, lack of employment poor services and infrastructure, which include lack of health and educational facilities, rising traffic problem, increasing pollution, lack of water, which means uncoordinated urban development , this should push governments in developing countries to realize socio-economic development and environmental protection , which are the components of sustainable development.

5.3 Urban Development Challenges in Egypt Urban environmental problems in Egypt are multi-faceted, urbanization and issues that come with developmental challenges; urban production and consumption patterns psychological orientation of urban residents as well as institutional failures, these problems pose serious environmental, economic and social challenges to achieve sustainable development in the country. A basic problem in developing country like Egypt is that the population growth rate is faster than the rate of developing infrastructure and services, while the growth rate of productivity is lower. Egypt s primary cities Cairo and Alexandria comprise 43% of the total urban population (17% of the total population of Egypt) while 77 cities comprise 4% of the urban population.

According to a World Bank report it stated that Egypt is facing an urban challenge, in the next years, Egypt population is expected to increase over 100 million most of it will occur within urban areas, accommodating this huge population in short period is a major challenge for the government, urban economies will need to generate about 700,000 jobs each year, urban infrastructure and public services a majority of Egypt's existing urban population is of limited income and suffers from a lack of appropriate urban services and high levels of unemployment and under-employment. While it is known that urbanization is affected by several factors the exploitation and utilization of resources are the most primitive driving force of regional development and urbanization, industrialization and modernization both encourages urbanization and utilizes massive amounts of resources There is an urbanization pattern appears in developing countries, in this Pattern, the sources that affect and restrict the process of urbanization lie in extroverted and environments factors called the exterior industrialization development strategy, export oriented demands, foreign investment and credits, the new international labor division order, economic intervention had a crucial function **A World Bank**

report (2008) analyzed the Egyptian urban development experience considering new compact cities that it did not achieve its goals due to the following.

- The problem of Long distances between new constructed cities and existing one.
- The problem of the non-connections between new and existing cities through a transit system.
- The problem of corrupted policies.

5.4 Challenges and Opportunities Facing Urban Development in Egypt:

- a) Urban sustainable development and poverty is a basic challenge to the efforts of achieving sustainable development in Egypt.
- b) Rapid increase population is another challenge for achieving sustainable development in Egypt.
- c) Immigration increase from rural to urban area.
- d) Mismanagement of the use of natural resources, especially resources and energy that requires promoting of sustainable and consumption.
- e) The lack of environmental awareness aggravates the problem of natural resources; it generates sanitation, hygiene and environmental problems at the community level.
- f) Climate change also puts pressure on natural resources, the combination of rapid economic expansion, continued population growth and changing climate raises the possibility of resource scarcities.

Egypt and Energy Debate Some estimation indicate that natural gas and oil reserves , on which Egypt's electricity generation currently relies , will run out in 30 or 40 years According to the international energy agency 2012 estimates that water consumption for energy production will increase by 85% while reaching 2035, global energy demand to be increased by an about one third before reaching 2035. Egypt should concentrate its effort for the renewable energy resources, which can be supplied through solar hot water technologies and photovoltaic, wind energy system and Methane; buildings can maximize passive solar design, minimizing heating and cooling needs.

Egypt and Solid Waste Management (SWM) The situation of the SWM clarify the follow

- No national program for SMW.
- Limited laws concerning SWM in Egypt.
- Limited public participation and awareness.
- Collection of waste by informal collectors (zabaleen)
- Poor Recycling activities by informal collectors system.

Egypt and Water Resources Water is a fundamental element for sustainable development in Egypt; moreover, on the long run it requires searching for alternatives and determining the water resources available at present and additional resources that we can obtain in the future. Egypt's main source of freshwater is the Nile, according to an agreement between Egypt and Sudan Egypt its part 55.5×10^3 M³; it's subject to unsustainably due to high levels of industrial, agricultural and domestic wastewater pollution. The World Health Organization 2008 Report *Safer Water, Better Health* indicates that %5.1 of all deaths and %6.5 of all disabilities in a year in Egypt are attributable to unsafe drinking water availability in Egypt is on steady decline from about 1.896 cubic meters per year in 1959o about 900 cubic meters in 2000, to 700 cubic meters in 2012, According to the Ministry of Water Resources and Irrigation, Egypt will need 20% more water by 2020, Egypt could be water scarce by 2025 According to the

United Nations says, the combination of water scarcity and pollution of the water availability , could be one of the worst resource crises Egypt could face

Egypt Transport Sector Urban Density and Centralization of jobs have a strong relationship with transport patterns specially the level of car dependence and the effectiveness of public transport, more centralized cities tend to have less central city parking, stronger rail systems and more use of public transport for radial trips, higher densities can bring greater protection of the natural environment but all this applied on the developed countries, the result is vice versa in the developing countries. Developing countries need to create higher density development will means less land devoted to sprawl and more land for open space, gardens and urban agriculture, greater emphasis on community spaces should also means more opportunity for locally managed systems for waste, energy and water, Sustainable transport should be available in Egypt, good transit, walk ability and cycling facilities would shape sustainable Egypt. Motorcycles can avoid traffic queues and are the cheapest form of motorized private transport for moderate income people, but they are also a major cause of air pollution, noise and transport deaths in these cities.

Mobile emissions are one of the major sources of air pollution in the country, producing about 25% of Egypt's CO₂. The number of vehicles registered in Egypt increases from 3.6 million vehicles in 1992 to almost 6.6 million vehicles in 2005.

According to Egypt Information Portal, 2007 Due to traffic congestion, Cairo had the nation highest concentrations of carbon dioxide 6.8 mg /m³ (According to Egyptian Environmental affairs Agency, 2004) The big task for Egypt is to create a balance between the environmental, social and economic aspects before addressing being sustainable , regarding the environmental aspect the large and growing carbon dioxide emission from transport have become an issue we can no longer ignore emissions concentrations might reach between 650 and 700ppm of carbon dioxide by 2050 and between 800 and 1300 ppm of CO₂ by 2100 .

According to the Organization for Economic Cooperation and Development 2012 it is determined to preserve the quality of Egypt air, so motor vehicles must be carbon neutral and the plans provide for the construction of hydrogen filling station for fuel cells. The solution for Egypt is to complete the network of the rail, and to concentrate on the public transport, to encourage the idea of walking and cycling which are the most sustainable modes of transport.

Egyptian infrastructure: Egypt possesses a vibrant construction industry, which its growth average 6.8% during 2007-2011, the government continued with its programme of economic reform with major privatization and investment activity during 2007 to 2008 In Egypt we need the solution for radical change in town planning strategy and transformation to sustainable development.

- An action environmental agenda is highly recommended for Egypt.
- We should conserving, protecting and restoring natural resources.
- Encouraging healthy environmental practices.

Countries are consumers of natural capital such as water, energy and other natural resources they are producers as well of large quantities of wastes, in order to avoid serious ecological collapse developing countries like Egypt should adopt sustainable ecosystems.

Egypt must reduce its use of all resources and decrease their waste outputs to become a sustainable country, it must increase its livability in terms of health, employment, income, education, housing, urban design quality Egypt could be described as a sustainable country when it will be able to provide the needs of the population along with the necessary infrastructure health, housing, education, transportation, employment and good governance. The population in Cairo increases every year due to immigration, this increase put strain on

housing, employment, healthcare, water and electricity population lead also to crime due to weak job opportunities.

6. Research Problem

Urban sustainable development is a challenge for developing countries; we question how urban development could be used to help developing countries to deep the concept of sustainability.

6.1 Research Question

Based on the above mentioned research problem the following research question is raised

Is applying sustainable urban development could help in the improvement of developing countries?

6.2 Research Objective

The principal objective of this paper is to emphasize the challenge confronts developing countries while applying sustainable urban development.

To address the preceding research question the objective of this paper is

To examine if applying sustainable urban development methods could help in the improvement developing countries sustainability.

7. Research Methodology

In this paper, we explore the concept of applying sustainable urban development and its effect on developing countries, a mixed method of research will be used to conduct the study, the practical part will be conducted by questionnaires, and the theoretical part will rely on periodicals, articles, books.

7.1 Data Collection

The methods used for the data collection was e-mail surveys. The study population was divided into manageable groups within people interest in environmental area and work in it in order to select the sample frame of the study. Out of the 500 questionnaires distributed through e-mail surveys, 100 questionnaires were returned representing a 20% return rate, which was deemed satisfactory.

The questions covered information of the respondents and their assessment of urban development factors in developing countries. Likert Scale questions varied from discussing their understanding of the key elements of urban development in developing countries to the relationship that exists.

7.2 Research Hypothesis

H0: There is a statistically significant relation between applying sustainable urban development methods and improving the situation of the developing countries.

H1: There is no statistically significant relation between applying sustainable urban development methods and improving the situation of the developing countries.

Results and Discussion

Table 1: Means and Standard Deviation minimum, maximum of the factors which have impact on urban sustainable development (USD)

Variable	Observation	Mean	Standard deviation	Minimum	Maximum	CV	Significant level
TP	100	4.9000	.30151	4.00	5.00	.481**	.000
WCP	100	4.7600	.42923	4.00	5.00	.506*	.000
ECP	100	4.4800	.50212	4.00	5.00	.306**	.000

WMP	100	4.7600	.42923	4.00	5.00	.295**	.003
GA	100	4.6400	.48242	4.00	5.00	.285**	.004

Notes: TP: Transport Problem, WCP: Water Consumption Problem, ECP: Energy Consumption Problem, WMP: Waste Management Problem, GA: Green area

-.**. Correlation is significant at the 0.01 level (2-tailed).

The descriptive statistics in (Table 1) demonstrate that transport problem has a mean of 4.9 and a range between 4 and 5, water consumption problem has a mean of 4.76 and a range between 4 and 5, energy consumption problem has a mean of 4.48 and a range between 4 and 5, waste management problem has a mean of 4.76 and a range between 4 and 5, green area and infrastructure has a mean of 4.64 and a range between 4 and 5. Which means that values for each variable are valid especially the variables are measured by Likert scale from 1 to 5. The correlation coefficient of transport problem is .481** with significant level .000, water consumption Problem is .506 with significant level of .000, energy consumption is .306 with significant level of .000 waste management problems is .295 with significant level of .003, green area is .285 with significant level of .002.

This means that water consumption problem, energy consumption problem and transport problem has no relation with improving the situation of developing country if it apply sustainable urban development methods, the expansion of the green area and infrastructure has a positive relationship in improving the situation of developing country if it apply sustainable urban development methods.

Table 2:

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum	Correlations	Significant level
if we have a good public transportation network will reduce environmental fingerprint	100	4.1800	0.97835	2.00	5.00	.481**	.000
if we use water solutions will reduce water consumption	100	4.2900	0.60794	3.00	5.00	.506**	.000
if we use energy renewable solutions will solve energy problem	100	4.3400	0.65474	3.00	5.00	.306**	.000
establishing recycle, reuse and separation program will reduce environment finger prints	100	4.4200	0.95537	2.00	5.00	.295**	.003
the increase of green area could be a tool of applying sustainable urban development	100	4.6400	0.48242	4.00	5.00	.285**	.004

The descriptive statistics in (Table 2) demonstrate that a good public transportation network will reduce environmental fingerprint it has a mean of 4.1 and a range between 2 and 5, water solutions use to reduce water consumption it has a mean of 4.2 and a range between 4 and 5, energy renewable solutions use to solve energy problem it has a mean of 4.3 and a range between 3 and 5, establishment of recycle, reuse and separation programs will reduce environment finger prints it has a mean of 4.4 and a range between 2 and 5, the increase of green area could be a tool of applying sustainable urban development it has a mean of 4.64 and a range between 4 and 5. Which mean that values for each variable is valid

Table 3: Simple Linear Regression for testing the effect of TP, WCP, ECP, WMP, GA and infrastructure as a tool of urban sustainability to improve the situation of developing countries.

Model Summary

Model R R Square Adjusted Square RStd. Error of the Estimate

1	.249a	.062	.012	.49946
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a. Predictors: (Constant), the increase of green area could be a tool of applying sustainable urban development, establishing recycle, reuse and separation program will reduce environment finger prints , if we use water solutions will reduce water consumption, if we have a good public transportation network will reduce environmental fingerprint, if we use energy renewable solutions will solve energy problem.

b. Dependent Variable: we have an infrastructure problem

The descriptive statistic in (Table 3) demonstrate that the simple linear regression for testing the effect of TP, WCP, ECP, WMP, and GA as independent variables and infrastructure problem as dependent variable according to it the increase of green area could be a tool of applying sustainable urban development.

Table 4: ANOVAa

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.551	5	.310	1.244	.295b
	Residual	23.449	94	.249		
	Total	25.000	99			

a. Dependent Variable: we have an infrastructure problem

b. Predictors: (Constant), the increase of green area could be a tool of applying sustainable urban development , establishing recycle , reuse and separation program will reduce environment finger prints , if we use water solutions will reduce water consumption , if we have a good public transportation network will reduce environmental fingerprint , if we use energy renewable solutions will solve energy problem

Anova: Analyzes and clarifies the differences between eta-squared and partial eta-squared in fixed

Factor analysis of variance.

The descriptive statistics in (Table 4) (Anova) demonstrate that we have infrastructure problem as dependent variable the increase of Green area and good public transport network as independent variables could be a tool of applying sustainable urban development.

Table 5:

Model	Unstandar dized Coefficients		Standardized Coefficients	t	95.0% Confidence Interval for B	
	B	Std. Error	Beta		Lower Bound	Upper Bound
(Constant)	4.402	.569		7.731	3.271	
if we have a good public transportation network will reduce environmental fingerprint	.001	.085	.372	2.250	.022	
if we use energy renewable solutions will solve energy	-.002	.157	-.002	-.011	-.313	.309

problem						
if we use water solutions will reduce water consumption	-.104	.172	-.126	-.605	-.445	.237
establishing recycle , reuse and separation program will reduce environment finger prints	-.084	.073	-.160	- 1.143	-.230	.062
the increase of green area could be a tool of applying sustainable urban development	.070	.108	.067	.646	-.145	.284

Dependent Variable: we have an infrastructure problem

According to (table 5) we assumed that the dependent variable is the infrastructure problem, and independent variables are good public transportation network to reduce environmental fingerprint, energy renewable solutions to solve energy problem, water solutions to reduce water consumption, establishing recycle, reuse and separation program to reduce environment finger prints, the increase of green area could be a tool of applying sustainable urban development by analyzing the above table we found that standardized and unstandardized coefficient for using energy solution to solve energy problem is -0.02 , to use water solution to reduce water consumption is -.126 and -.104 , to establish recycle program to reduce environmental finger prints was -.160 and -.084 , but it was positive for two factors, if we have a good public transportation network will reduce environmental fingerprint it was 0.372 and 0.01 and sig .000 the increase of green area was 0.067and 0.70 and sig .020 which means good transportation network and green area expansion could be a tool of applying sustainable urban development

This means that if developing countries have a good public transportation network it will help in the process of urban development in this countries as well as if those countries expanded in the green area could be a tool for improving the urban development process in the developing countries

Conclusions

Low levels of economic development, modest urban budget, shortage of environmental infrastructure, shelter and basic services and high level of urban poverty looks equally as unsustainable.

This paper investigated the challenge confronts the developing countries in applying sustainable urban development. We used a spss package (statistical package for the social sciences) to analyze our data, the empirical evidence strongly supports our hypothesis H0 that there is a statistically significant relation between applying sustainable urban development methods and improving the situation of the developing countries, by analyzing some factors could have a positive effect on urban development, transport problem and using a good transport network , green area expansion as a way of applying sustainable urban development methods, the situation of developing countries will be improved .

Recommendations for Sustainable Development in Egypt

Sustainable development should be regulated by national law, unfortunately national laws in Egypt in terms of sustainability are not very well implemented yet, there is a need for a new approach on how to achieve the goals of sustainability in developing countries. Different standards of sustainability for different areas will be the possible solution, a certification system that sets the standards according to the area where the company is located could be a solution,

and Sustainability should be measured depending on the characteristics of the community without forgetting the social, environmental and economic components. For Egypt we recommend the following

- Putting strategies to reach a better country sustainable development.
- Financing the strategies through several resource instruments.
- Applying policies and regulations to reduce bad environments habits.
- Applying the concept of resource mobilization
- Public awareness of sustainable development and its benefits.
- Applying renewable energy strategy through solar hot water technologies, wind energy system.
- Applying Waste recycle and reuse programs
- Create places which are environmentally and socially attractive to develop a better urban economy.

Limitations of this study

This study was limited to just one country as a developing country, future studies would be ideal to major sustainable urban development in more than developing country This study concentrated on sustainable urban development in general, further studies recommend it to focus on specific process of sustainable development which can generate a more reliable response.

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