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# THE IMPACT OF TRANSPORTATION AND COMMUNICATION TECHNOLOGY DEVELOPMENT ON THE URBAN STRUCTURE OF NEW EGYPTIAN CITY

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## ABSTRACT

This paper discusses the impact of Transportation and Communication Technology (TCT)[1] on new Egyptian cities structure in terms of various city elements for both buildings, spaces and roads network. The paper also discusses the impact of (TCT) on the city service structure and standards. The paper referred to the development of road networks, modes of transport and types of transport, which indirectly affect the elements of generated trips and changed the requirements of means of movement and also influenced population preference to transport means to each others. This paper will determine the impact of the IT evolution on the physical structure of the Egyptian city structure through the development indicators of the two main factors which have a clear impact on the future of the city's urban structure which are:

- Development of transportation technology.
- Development of communication systems.

The indicators of the development of each axis and its impact on the city's components of the urban structure will be identified and thus the changes and development that will occur as a result of the evolution in these areas will be concluded.

**Key words**:
Service standards, Services structure, City urban structure, Transportation and Communication technology (TCT), General Organization of Physical Planning (GOPP),

**الملخص**

في هذه الورقه البحثيه يتم التعرف على مدى تأثيرالتطور التكنولوجي على عناصر المدينة المختلفة سواء على مستوى كتل المباني أو الاستعمالات داخل المدن، وكذلك عناصر ومكونات الهيكل العمراني للمدينة شاملا الهيكل الوظيفي وخاصة معدلات الخدمات التي تأثرت نتيجة التطور الهائل حيث أثرت على الخدمات التجارية فظهرت التجارة الاليكترونية، وتأثرت الخدمات التعليمية بالتعليم عن بعد بما يؤدي الى التأثير على الاستعمالات التعليمية، وتأثرت المباني الإدارية ، وتغير موقعها داخل المدينة، وكذلك تأثيرها على هيكل الحركة حيث اثرت التطورات التكنولوجية بشكل مباشر على تطوير شبكات الطرق واساليب الانتقال وانواع المواصلات، واثرت بشكل غير مباشر على العناصر المولدة للرحلات وغيرت من متطلبات ووسائل الحركة واثرت ايضا على تفضيل السكان لوسيلة مواصلات عن غيرها، وسيتم التركيز في هذه الورقه البحثيه على تحديد مدى تأثير التطور فى تكنولوجيا المعلومات على الهيكل العمراني للمدينه المصريه من خلال مؤشرات التطور لمحورين اساسيين لما لهما من تأثير قوي على مستقبل الهيكل العمراني للمدينة وهما :

- أولا: التطور فى وسائل النقل والمواصلات.
- ثانيا : التطور فى وسائل الاتصال

[1]Transportation and Communication technology will be named in this paper (TCT)

ويجدر بالاشاره ان هناك عوامل اخرى ولكن لامجال للتعرض لها فى هذه الورقه البحثيه وسيتم التعرف على مؤشرات التطور لكل محور ومدى تأثيره على عناصر المدينة ومكونات الهيكل العمراني لها ومن ثم تستخلص التغيرات والتطورات التى سوف تحدث نتيجة التطور في هذه المجالات.

**وتتركز المشكله البحثيه على** التطور المستمر فى تكنولوجيا الاتصالات والمعلومات ووسائل النقل والمواصلات يؤثر يشكل سريع ومتغير على الهيكل العمرانى للمدن المصريه وخاصة المدن الجديده.

**وتهدف الورقه البحثيه :** و تهدف الورقه البحثيه الى التعرف على حجم ونوعية التغيير المتوقع على الهيكل العمرانى للمدن المصريه الجديده وهياكل الخدمات بها وذلك من خلال المحورين السابق زكرهما. ويعتمد البحث على التكامل بين جزئين رئيسيين هما: الجزء النظري، والجزء التطبيقي. ويستعين الجزء النظري بالمنهج الاستقرائي، لتحديد المفاهيم المرتبطة بتأثير التطور فى تكنولوجيا المعلومات على الهيكل العمراني للمدينه المصريه من خلال مؤشرات التطور للمحورين (وسائل النقل والمواصلات & وسائل الإتصالات ). واما الدراسه التطبيقيه تعتمد على المنهج الاستنباطى من خلال استخدام أداة من أدوات البحث وهي (دراسة الحالة) حيث يتم عمل دراسة حالة لبعض المدن المصريه الجديده لدراسة التطور فى معدلات الخدمات بها وذلك بالرجوع الى دراسات سابقه قام بها الباحث فى بداية التسعينات من القرن الماضى على معدلات الخدمات لبعض المدن المصريه ومقارنتها بمعدلات الخدمات المستخدمه فى تخطيط المدن المصريه حديثا حيث قامت الهيئة العامة للتخطيط العمراني في عام ٢٠١٤ بإعداد دليل المعدلات التخطيطية للخدمات في جمهورية مصر العربية وبذلك يتم تحديد مدى الغيير الحادث فى هياكل الخدمات للمدن المصريه الجديده.

**First: Paper problem: -**

The continuous development of (TCT) systems has rapid effects on the urban structure of the Egyptian new cities. These effects have elevating effects on areas of some types of services and decreasing these areas for other types. These changes of service areas will not be compatible with (GOPP) manual of services standards 2014.

**Second: Paper objective:**

Technology is rapidly evolving in all areas, including transportation, communications, cultural, social, political, and economic aspects. This development shows features and indicators in the new Egyptian city elements which affect its urban structure. This paper will discusses only two factors which heavily affect the urban structure of new Egyptian cities, which are:

1. Development of transportation technology.
2. Development of communication systems.

This paper aims to identify the expected change and its impacts for the urban structure of new Egyptian cities.

**Third: Paper Methodology**

This research depends on the integration of two main parts: theoretical, and applied. The theoretical part depends on the inductive methodology to identify the concepts associated with the impact of the IT evolution on the urban structure of new Egyptian cities through the development indicators of two mentioned factors (Transportation technology and Development of communication systems) which have a strong impact on the future of the urban structure of the Egyptian city. The applied study is based on the deductive methodology through literature review (especially conducted by the researcher) in the beginning of the nineties of the last century on the standards of services for such cities. Comparing these standards with services standards used in the planning of latest Egyptian cities. These data are also compared to the manual of service standards prepared by (GOPP) in 2014 as a guide to the standards of services in Egypt. Thus the change of service structures of new Egyptian cities can be determined.

**Fourth: Theoretical study**

**4-1: Components of the Urban Structure of the City:**

Many experts describe the city by classifying its components into 4 elements as in [ Fig. 1]: .[2]

- **Function:**

which describe the activities performed at the city areas including natural and artificial usage as landscape elements of the site, services areas and residential community's zones (clusters, neighborhoods, and districts) which is concerned with the land uses activities.

- **The Voids:**

They are including undeveloped areas and empty land.

- **Transportation:**

It means the inter-linking elements between different uses or buildings including traffic system: (roads and paths).

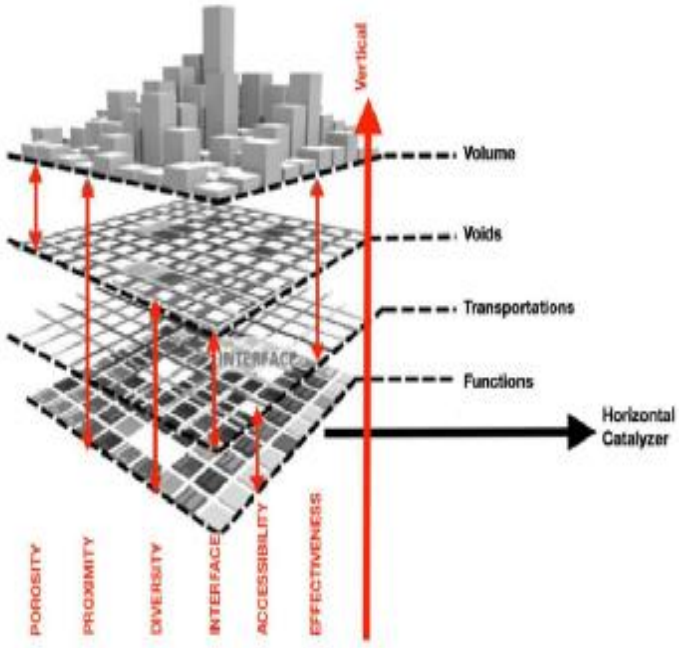


**Fig 1: Urban structure of the city components.**
**Source: Adolphson, M., *Estimating a polycentric urban structure.***

- **Volumes:**

They are including types of buildings, sizes and general direction in terms of layout (horizontal or vertical), which create spaces between them.

The Urban structure terminology emerged by some planners to identify and give more accurate determination of the city as,[3] Richard Shearmur who defined city urban structure as spatial distribution of urban activities and functions inside a urban area, based on many criteria and specifications for compatibility between several elements (population, densities and population characteristics as the natural environment).

### 4-1-1: General characteristics of city's urban structure:

The urban structure of the city includes the fixed functional components which are the land uses in addition to the visual image of the city[4]. Land use provides the main elements for the structure of the urban structure through the following two factors:

• The spatial pattern of the location of the different activities and the reciprocal relationships between them. It is controlled by demand and supply for different types of activities.

• The capacity and quality of movement structure and accessibility, which are of great importance in the formation of the urban agglomeration through the performance rates which can be controlled in the context of increased accessibility.

These factors axes contribute to the development of urban fabric and urban structure. They also confirm the role of land use to clarify the pattern of development by shape and location of the site.

### 4-1-2: Factors affecting urban structure of new urban cities:

Urban structure of the city ffected by three basic elements which are[5]:

[2] Adolphson, M., Estimating a polycentric urban structure. Case study: urban changes in the Stockholm region 1991–2004. Journal of Urban Planning and Development. Volume 135. Issue 19. March 2000

[3] Richard Shearmur, McGill University, what is an urban Structure? The challenges of foreseeing 21st Century Patterns of the Urban Economy, 2013 – from Web site - https://www.researchgate.net/publication/297225871_What_is_an_urban_Structure_The_challenges_of_foreseeing_21st_Century_Patterns_of_the_Urban_Economy

[4] د.ابو سعدة،هشام. (١٩٧٧) *الكفاءة والتشكيل العمراني*. القاهرة: المكتبة الأكاديمية بالقاهرة.

- Social and economic characteristics: They strongly affect the functional structure of the city and its visual structure. They have a great power to form economic activities and land uses of all its types, as well as its effect on visual characteristics, and determine the areas and neighborhoods and identify the paths. In addition to the definition of spaces and squares and their characteristics as a result of the activities that will be practiced.
- Environmental and natural characteristics: It defines the pattern and shape of the city and defines the relations between building blocks and the spaces and the characteristics of each of them. It also determines the outer frame of the city image as well as some visual properties and visual configuration of the spaces and blocks and city borders or edges.

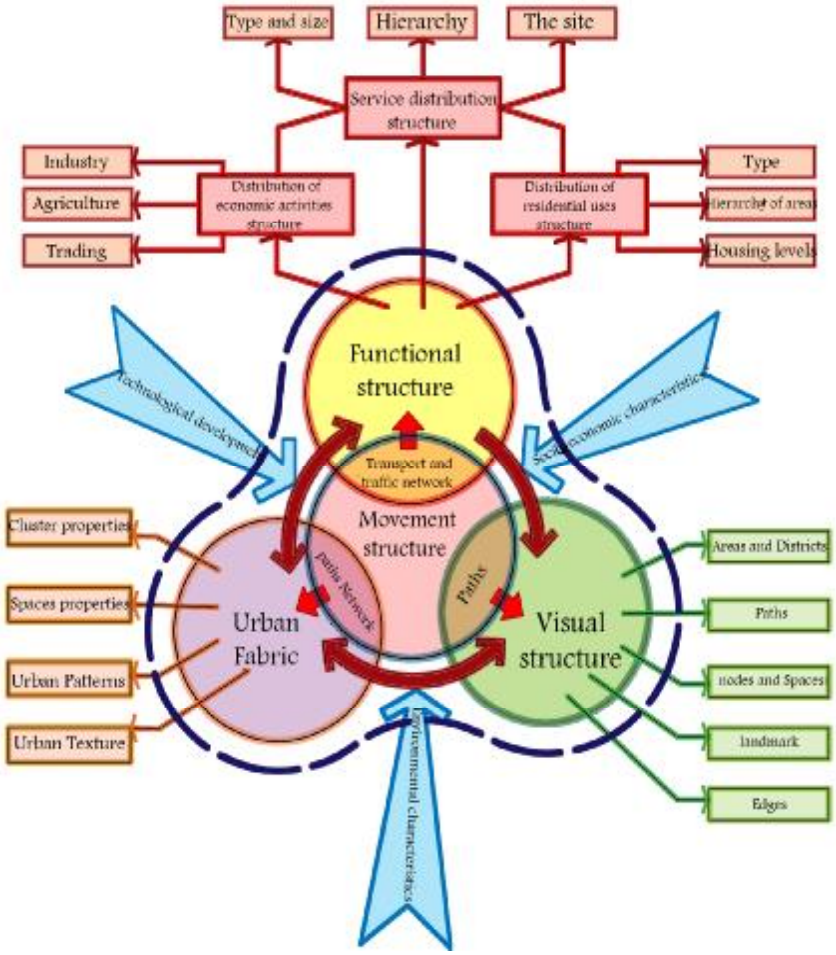


**Fig 2: Theoretical base for the city urban structure**
**Source: Researcher**

- Technological characteristics: Technological development affects the functional structure and also affects the structure of building blocks and spaces of the city. Figure (2) illustrates theoretical base for the city urban structure.

## 4-2: The impact of transportation technology development on the city urban structure.

[5] - د.البهنساوي، احمد على سليم.(٢٠٠٨) *معايير تحديد الاهمية النسبية والدور الوظيفي للتجمعات العمرانية الريفية في اطار النخططات الاقليمية*. القاهرة: كلية الهندسة،جامعة الازهر.

Technological development of transportation is still one of the most important reasons and influences on the urban structure of the city, as it had strong impact on all areas of life. The elements of technology start with the use of human devices such as home appliances and control devices and different networks to connect with all other elements, both near and far. Besides, the method of controlling the elements either remotely or in direct manner.

The urban development in any area is related to the accessibility and the quality of transportation used by passengers to access their areas of residence to other areas, especially business trips, which represent most of the trips within any city or urban communities.

From horse-drawn vehicles to modern-day transportation, development of means of transportation has played an active role in shaping the urban structures of the city. The rate of urban growth has increased at access points and around its paths. Then the existence of new means of transportation from the stop points to any distant points has been used to improve characteristics and relations between transportation and urban structures in some theories. Then characteristics of new means of transportations had been used in the development of new urban communities.

**4-2-2: Indicators of Development in Transportation**

There are many indications of a significant change in mobility as a result of changing the characteristics of means of transport, which will be more rapid, as Japan announced the existence of the Maglev new train, which works with magnetic propulsion and speed of more than 600 km / h, a train planned for use in 2027[6]

One of the most important examples is the emergence of modern and renewable means of transportation, for example:

**• Flying Taxi**[7]

The flying taxi can also run on wheels. Certain types of helicopters can also be used to transport passengers, such as Euro Copter ECI 20B (Hover Taxi)8. Once the flying means of transportation is activated, they will be laser-driven through air paths. This technique was used in Osaka Airport in Japan, where the landing was driven through laser paths9.

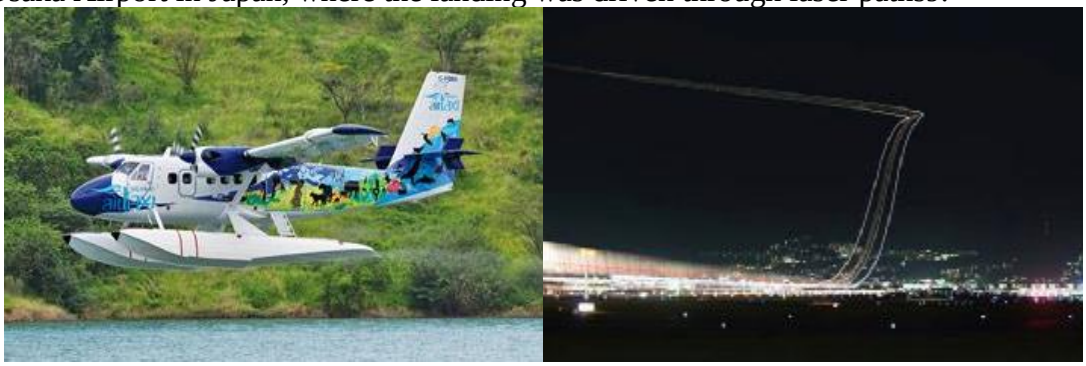

**Figure no (3) Flying taxi and the laser path in Osaka Airport**

Continuous improvement is made to the flying taxi, where NASA announced launching the flying taxi in 2005 with the name SATS- Small Air Transport. Such ean will be equipped to be ready for use in the USA to transport passengers and delivery as well.

[6] BBC (2015) *Japan Fast Train* [Video Podcast]1 September. Available from: http://www.bbc.co.uk/arabic/multimedia/2015/04/150421_japan_fast_train [Accessed July 2015]

[7] - Marisa Cannon. Are flying taxis about to become a reality? CNN • Updated 10th September 2018 - https://edition.cnn.com/travel/article/uberair-flying-taxis/index.html - accessed 2018

[8] *Taxing*, (2015)Last Modified on 25 June 2015. [Online]. Available from: http://en.wikipedia.org/wiki/Taxiing [Accessed July 2015]

[9] Raouf (2014) *The Flying Taxi in Sri Lanka.* [Online]. Available from http://www.almosafr.com/forum/t87742.html [Accessed 2015]

**Drones**[10]

Orders can be transported by aircrafts without pilot in European states, USA, and China. Transport companies include Google, Amazon, and Ali Baba which controls the transactions through satellites using in-house control rooms.[11] Transportation of parcels and goods have also been applied in certain Arab countries such as Emirates.

**Figure (4) shipment crafts without pilot**

• **Cars without driver**[12]**:**

Such cars are driven without drivers using sensors that enable the vehicle from following a pre-registered map. Drivers can interfere in emergency cases. Vehicles can also be controlled through satellites by control units at the companies undertaking its operation. Various western states, China, and USA compete to acquire such vehicles. The English Government announced that it may be used starting 2016, while Google announced its plans to manufacture 100 vehicles.

**Figure (5): self-driven vehicle connected to satellite control units**

• **Floating cars and buses**[13]:

Floating cars are not novice, where Typ 166 from Volex Wagen was especially manufactures for the German Army during the WW2 1940. Such car operated both on land and on water. It transforms to a fan-driven boat. Various efforts were conducted by international companies to manufacture such vehicles, as well as floating buses.

• **Over-Sea Trains**[14]:

Plans are set by China to construct a train connecting Peking to USA. Chinese experts and officials are discussing the route which will start from the eastern part. The railway will pass through east Siberia, through Bejing harbor with length 125 miles under the water in Alaska. The railway can also be connected by seas through huge ships that transport trains from a given coastal station to a coastal station in another country.

[10] ECER (2014) *Testing Aero planes with no Pilot* [Video Podcast] 22 February. Available from: https://www.youtube.com/watch?v=24YlgKuVtyc [Accessed July 2015]

[11] سكر، علاء (٢٠١٥) *واخيرا أمازون اختبار طائرة بدون طيار.* [Online]. Available from: http://www.tahrirnews.com/life/details.php?ID=397186 [Accessed 2015]

[12] BBC (2014) Britian Drivless Car. [Online]. Available from: http://www.bbc.co.uk/arabic/scienceandtech/2014/07/140730_britiain_driveless_cars [Accessed July 2015]

[13] - DW. (2014) *Floating Car TYP 166* [Video Podcast]1 September. Available from: https://www.youtube.com/watch?v=YruhE7EKGPU#t=66 [Accessed July 2015]

[14] Agatha Kratz, Dragan Pavlićević, China's High-Speed Rail Diplomacy: Riding a Gravy Train?- Lau China Institute- Kings college - London - 2017

### 4-2-2: The expected change of the repaid transportation technology for the city's urban structure

As a result of the above, we find that there have been developments in the means of material transport. The means of walking on the roads and vehicles that run on rubber tires in addition to aircraft and ships and vehicles that can move in more than the way, such as land water vehicles, and there are indicators emerged for the development of the future means of transport increased The speed of some vehicles reached more than 600 km / h, and new means appeared such as small drones, the back of the taxi, the transatlantic trains and the taxi and guided by the satellite, which goes without a driver, in addition to the development of transport Winding, it emerged as the giant ships and all this heralds the presence of types to facilitate the transition from one place to another and provide the time and convenience.

These new means will require a change in the specifications of some other elements. It will need special specifications for new pathways for driving without drivers, with celestial pathways for private jets and flying taxis. It will also need stops for these types. All these changes will need new elements and buildings to control paths of these means[15].

The popularity of these means in the future will increase its impact on the urban structure of the city where it will affect the functional structure of the career re-distribution of the network of roads and uses around it, and will affect the visual structure as a result of the impact of technology on the elements of traffic guidance and signs directed electronically for cars without driver and will show the paths of heaven-guided laser and many airstrips Private jets which will have stops on building roofs.

## 4-3: The impact of communication means development of the city's urban structure

Since 1985, upon the introduction of voice and video chat on computer or mobile communication networks, a huge boom has been seen in communications and its means of use. It is no longer just text messaging, as it has been since the invention of telegraph, fax and even telephone. The concept of physical distance and proximity is becoming less importance and is now being re-examined because the ease of communication, the Internet, the virtual world and optical fibers[16], all making remote cities on different continents closer to each other. Already here from neighboring cities, the electronic network of complex fiber optics and the Internet helped that people perform their jobs anywhere (home during the travel, transportation and tourist areas and entertainment). Every development in communication technology has a clear impact on urbanization, with a qualitative and quantitative leap forward in all fields and activities. This has affected the manifestations of this construction. There has been a great development in the means of communication, and it is no longer confined to traditional telephones or landlines or mobiles.

The means of communication witnessed material changes since the invention of the mobile phone. Mobile phones developed from simple phones enabling phone calls and simple text messages to smart phones that can play the role of telephone and computer. Its now possible to send audio or video messages. Audio and video files can also be transferred.[17].

The development has led to increased communication among humans in every zone of the earth and the world has become a small community because of each of its inhabitants close to each other. The means of communication facilitated the process of telecommuting between members of the family and society, and the distance between cities and countries and continents, accesses the Internet through these phones.

The role of telephones was not limited to talking, transferring files, pictures and videos, but extended to work and commerce, where it helped to work from anywhere, home, car or street, especially administrative work, as well as shopping, buying and selling operations that became one of the tasks Smartphones and the Internet. As the smartphone evolves, its potential and uses increase to the point that most of what people need for a smartphone can

[15] ميشيو،كاكو. د.خرفان، سعد الدين (ترجمة).،و سونس،محمد(مراجعة) .(٢٠٠١) *رؤى مستقبلية – كيف سيغير العلم حياتنا في القرن الواحد والعشرين* . القاهرة:عالم المعرفة.

[16] ميشيو،كاكو. د.خرفان، سعد الدين (ترجمة).،و سونس،محمد(مراجعة) .(٢٠٠١) *رؤى مستقبلية – مرجع سابق*

[17] - م.يوسف، وائل محمد. (٢٠٠٣) *مستقبل العمران في عصر تكنولوجيا المعلومات* . رسالة دكتوراه. كلية الهندسة، جامعة الازهر.

play a role in its performance, such as social relationships, sales, buying, shopping, and business / services.

**4-3-2: Evolution of Information Technology features:**

The methods of computer processing have evolved with data from data processing to information processing to knowledge processing. In parallel, databases have evolved into information systems to decision support systems to systems of expertise. This follows the development of knowledge from data to information to knowledge[18], Figure (6). With the development of artificial intelligence methods emerged the treatment of knowledge and emerged intelligent systems. Systems understand and analyze issues and demonstrate theories make decisions[19].

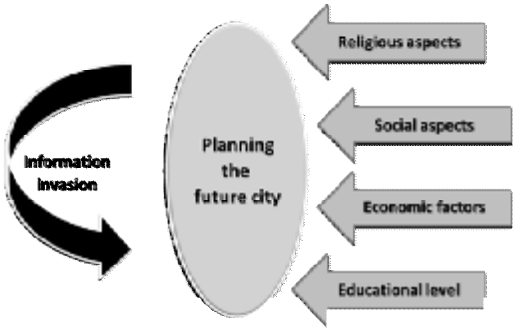


**Figure (6) Effect of information invasion and traditional cognitive factors on future city planning. Source Mich Kacaw –**

**4-3-3: Arise of Globalization:**

Globalization means convergence, communication and openness of social relations. Satellites were used in search of information networks and full text delivery and delivery of documents within a short period of time rabidly inforce the beginning of the information development era[20], people's lives in their interactions that appear to be occurring in one place. Heston and Thompson[21] noted that globalization is an advanced stage of capitalism characterized by the inability of governments to force global economic confrontations and its lack of control over the world economic powers and it is not a global economy as much as a means to control the Third World to drain its resources.

**4-3-4: The impact of rapid technological development of communications on the city urban structure:**

The indicators of the technological evolution of virtual communications lead to a tremendous evolution in the imaginary link between humans which will be easier and more used in the future. It will achieve the most immediate use and there will be more interdependence between people through means of communication and will increase the availability of programs and sites that lead to virtual social relationships, And social relations in normal and traditional ways. Economically speaking, there will be virtual work sites that can be done electronically through mobile and web pages and screens. Most of them will be administrative works. This is unlike online shopping, which will affect the structure of commercial services functionally, planning and architecture.

**4-4: Theoretical part indicators**

From this part it is concluded that the development of Transportation and communication have changes on the urban structure of new Egyptian cities. It seems that the cities agglomeration will need new elements such as buildings, paths, and removal or replace of some existing elements, which forcing for restructuring of the whole city. Some of the indicators of development in transportation and communications is the increase in the percentage of online shopping, decreasing the possibilities physical shopping for physical

[18] ميشيو،كاكو. د.خرفان، سعد الدين (ترجمة).،و سونس،محمد(مراجعة) .(٢٠٠١) *رؤى مستقبلية-مرجع سابق*

[19] ميشيو،كاكو. د.خرفان، سعد الدين (ترجمة).،و سونس،محمد(مراجعة) .(٢٠٠١) *رؤى مستقبلية – مرجع سابق*

[20] كلو،صباح محمد. (٢٠٠١) تكنولوجيا المعلومات والإتصالات وانعكاساتها على المؤسسات المعلوماتية .*مجلة مكتبة الملك فهد الوطنية*. مجلد ٦، عدد ٢ ،٥٩-٩٣

[21] Adolphson, M., Estimating a polycentric urban structure. Case study: urban changes in the Stockholm region 1991–2004. Journal of Urban Planning and Development. Volume 135. Issue 19. March 2004

shopping, and increasing the possibility of virtual dealing locally and globally, increase Online education, and more changes. All this will change the form of function for service buildings and all types of networks (The city functional structure, urban structure, and visual structural).

**Based on the literature review and its indicators, the following table shows the relation between elements of development of transportation and the current and prospect communication arena. Various indicators have manifested which had an impact on the city's urban structure. As follows element matrix:**

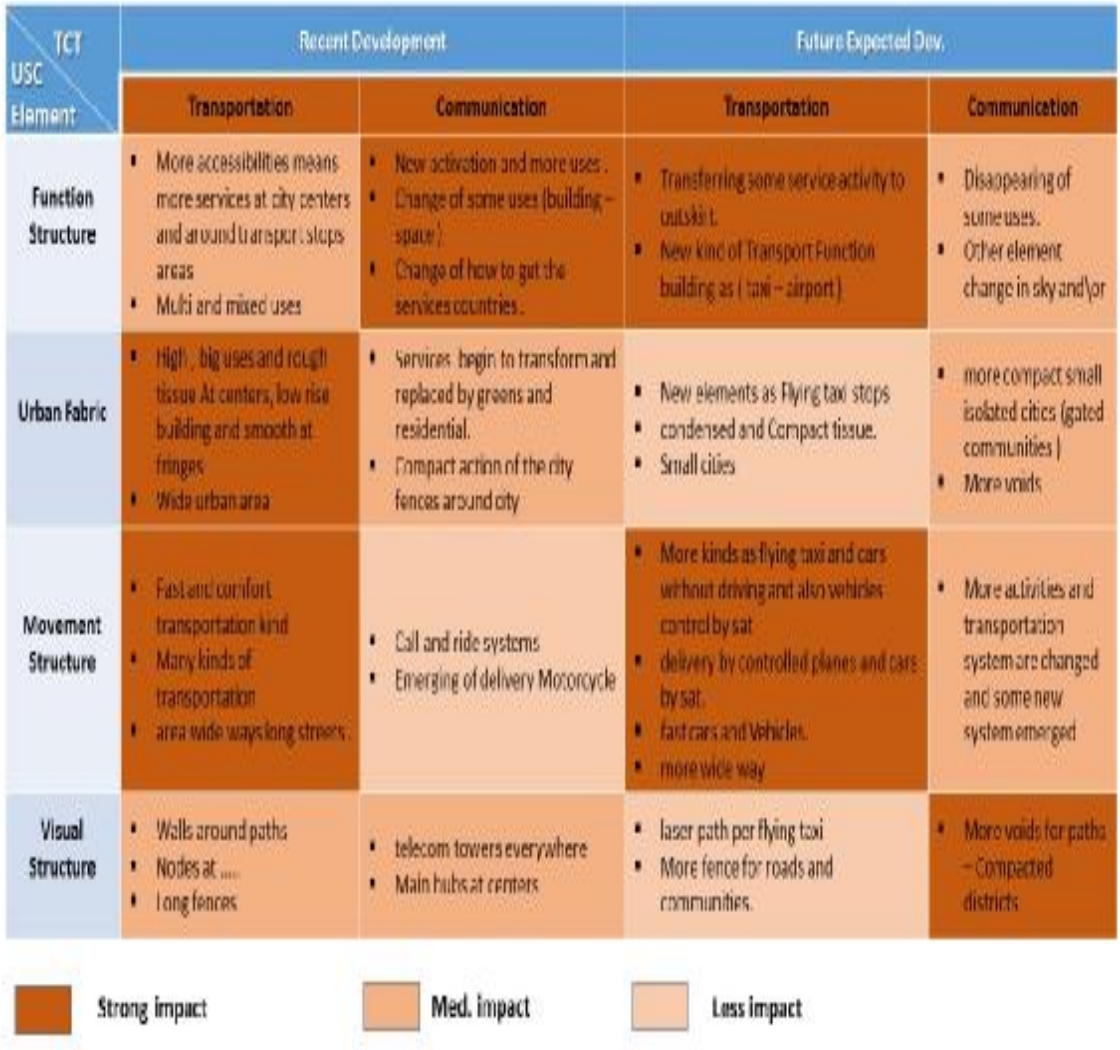


**Figure (5) TCT and Urban structure of city matrix**
**Source : Developed by Author**

## Fifth: Applied study

This part of the paper is based on a case study for certain new Egyptian cities planned at various generations in order to evaluate changes of its service standards. This applied study depends on previous studies concluded by the researcher in other studies for early new cities in Egypt.

## 5-1: Service standards used in early Egyptian new cities planning:

The proposed service standards for the city planning in the 1980s [22] were compared with the same type of service standards in 1990s and other at the early twenteith century. The (GOPP) manual which decided the service standards in the Arab Republic of Egypt at 2014 will be consider in this comparative study. This study will depend on the basic requirements of human beings affected by the conditions in which these cities arise. It also reviews the factors affecting both social and economic circumstances. Changes are witnessed in the proportions and areas of these services, which included all the basic services[23] as well as the percentages of the main green areas in these cities and communities. Examples of these studies have been guided by suggestions for standards of services in new cities, which were referred to planning new cities in the nineties and the beginning of the twenty-first century.

The following table (1) shows the percentage of total services based on the study of 18 new Egyptian cities compiled by the author from the specified reports of the new communities in Egypt in 199٠[24].

**Table (1) Egyptian new communities (case study selection) :-**

| S | THE CITY | (A) Population | (B) Urban area | (C) Residential density person\acre | (D) Total service areas "acres" | (E) Service area % | (F) share per Person Sq.m. |
|---|---|---|---|---|---|---|---|
| 1 | QUANTRA SHARK | 27,000 | 267 | 101 | 46.88 | 17.5% | 7.29 |
| 2 | SHATTA | 30,000 | 217 | 138 | 47.83 | 22.0% | 6.7 |
| 3 | EXT. OF 15 MAY | 60,000 | 515 | 116 | 165.17 | 32.0% | 11.56 |
| 4 | EL ALAMEIN | 65,000 | 866 | 75 | 243.1 | 28.0% | 15.7 |
| 5 | NEW QUENA | 108,000 | 1350 | 80 | 503.4 | 37.2% | 16.38 |
| 6 | EL MENIA | 120,000 | 1398 | 85 | 307.4 | 21.9% | 10.76 |
| 7 | NEW ASSIUT | 131,000 | 1791 | 73 | 496 | 27.6% | 15.9 |
| 8 | EL NOBARIA | 140,000 | 1525 | 92 | 395.6 | 25.9% | 12.78 |
| 9 | SETTLEMENT (5) | 200,000 | 1984 | 100 | 592.7 | 29.8% | 12.4 |
| 10 | EL AMAL | 250,000 | 2984 | 83 | 766 | 25.6% | 12.86 |
| 11 | NEW DEMIATTE | 270,000 | 3060 | 88 | 1045.7 | 34.2% | 17.37 |
| 12 | BADER | 277,800 | 2755 | 100 | 635.7 | 23.0% | 9.6 |
| 13 | SHEROK | 320,000 | 3530 | 90 | 1091.3 | 30.9% | 14.4 |
| 14 | 6 OCTOBER | 350,000 | 4900 | 71 | 1434 | 29.2% | 17.21 |
| 15 | EL-EBOUR | 475,000 | 2630 | 180 | 749.7 | 28.5% | 6.63 |
| 16 | 10 RAMADAN | 500,000 | 10768 | 46 | 1813.6 | 16.8% | 15.2 |
| 17 | EL SADAT | 500,000 | 5405 | 92 | 987.5 | 18.3% | 8.29 |
| 18 | NEW AMERIA | 500,000 | 9805 | 50 | 2550.6 | 26.0% | 21.42 |

**Source: Compiled by the author from the specified reports of the new communities in Egypt (١٩٩٠)[25]**

The following table (٢) shows the percentage of pilot services that were based on the study of 8 new Egyptian cities and the development of indicators of services standards, including in 1993[26].

[22] Sharaf El-Din,Ibrahim. (2003). *Community Service & Globalization*. France: ISoCaRP (AIU) Congress papers.

[23] Basic services include (commercial, educational, social, health, religious, and administrative services)

[24] Sharaf El-Din, Ibrahim Hassan Ibrahim (1995) Spatial Structure of Services for Urban Communities "The Impact of Spatial Patterns on Services Standards for new communities in Egypt. PhD, Zagazig Universty .

[25] Sharaf El-Din, Ibrahim Hassan Ibrahim (1995) *Spatial Structure of Services for Urban Communities "The Impact of Spatial Patterns on Services Standards for new communities in Egypt*. PhD, Zagazig University.

**Table (2) Indicators of service standards at the city level in a study of 8 new Egyptian cities in 1993**[27]

| Service type | Ebour city | Bader city | Amal city | New Demiate city | 6 of October city | America city | Sadat city | 10 of Ramadan city | Average standards |
|---|---|---|---|---|---|---|---|---|---|
| **Commercial** | ٠.٧٢ | ١.٥٣ | ٢.٦٤ | ٢.١ | ٢.٦٦ | ١.٦٩ | ١.٢٣ | ١.٨٥ | ١.٨ |
| **Educational** | ٢.٥٣ | ٢.٤٤ | ٢.٩١ | ١.٧٤ | ٤.٠٧ | ٢.٣٣ | ٣.٣٢ | ٣.٤٧ | ٢.٨٥ |
| **Social** | ٠.٤ | ٠.٣ | ٠.٤٠ | ٠.٤ | ٠.٤ | ٠.٤ | ٠.٥ | ٠.٥ | ٠.٤ |
| **Health** | ٠.٦٢ | ٠.٣١ | ٠.٢١ | ٠.٤ | ٠.٢٣ | ٠.٢٨ | ٠.٢٦ | ٠.٢٩ | ٠.٣٥ |
| **Religious** | ٠.٤٠ | ٠.٦٢ | ٠.٧٧ | ٠.٦٥ | ٠.٧٣ | ٠.٣٨ | ٠.٤٠ | ٠.٥٠ | ٠.٥٥ |
| **Administrative** | ١.٣ | ١.٣ | ١.٣ | ١.٣ | ١.٣ | ١.٣ | ١.٣ | ١.٣ | ١.٣ |
| **Recreational &Green** | ٨.٧١ | ٥.٨ | ٧.٢١ | ١.٢٦ | ٧.٤٤ | ٧.٩٤ | ٣.٦٤ | ٨.٩٥ | ٦.٣٦ |
| **Total** | ١٣.٦٨ | ١٢.٣ | ١٤.٤٠ | ٧.٨٣ | ١٦.٨٣ | ١٤.٣٢ | ١٠.٦٥ | ١٦.٨٦ | ١٣.٦١ |

The researcher included literature review on 16 new cities shown in Table (3) carried out in the early 80s. Various amendments and additions were made until the year 2000. The following data were included:

- Total areas of basic services in these cities represent 7.28% of the total area in 6 of October city, and up to 24.27% of the total area in Al Shorouk city. The average rate of basic services in the city was about 12.5%.
- The recreational & green services ranged between 2.41% in the 10th of Ramadan and 10.8% in the fifth Settlement which was planned in the 1980s. It was re-planned with other inter-regions for Settlement 1, & Settlement 3 and Settlement 5 in 1996. Total services ranged between 12.59% in 6th October City and 31% in Shorouk City.

Table (3) shows the areas and percentages of services for the cities that were planned until 1996. In the analysis of the previous table, the average standards of services used in the new cities in the mid-1990s are as follows:

- Basic services 12.5% of the total area of the city.
- Recreational services represent 6.78% of the total city.
- Total services represent 19.28% of the total city.

**Table (3) Comparison between basic and recreational services for some new cities planned between 1980 and 2000**[28]

| City Name | Area | Area of basic services | | Area of recreational & main green areas | | Total Area of recreational &green areas | |
|---|---|---|---|---|---|---|---|
| | | acres | % | acres | % | acres | % |
| 6th of October city | 11400 | 830 | 7.28 | 605 | 5.31 | 1435 | 12.59 |
| Al Sadat city | 7815 | 592 | 7.58 | 396 | 5.07 | 988 | 12.64 |
| 10th of Ramadan city | 13408 | 1491 | 11.12 | 323 | 2.41 | 1814 | 13.53 |
| Badr city | 3575 | 363 | 10.15 | 273 | 7.64 | 636 | 17.79 |
| 15 th of May city & it's extension | 2800 | 327 | 11.68 | 251 | 8.96 | 578 | 20.64 |
| New Canal | 1800 | 315 | 17.5 | 78 | 4.33 | 393 | 21.83 |
| New Amreya | 11238 | 1344 | 11.96 | 1208 | 10.75 | 2552 | 22.71 |
| Al Amal city | 3100 | 428 | 13.81 | 338 | 10.9 | 766 | 24.71 |

[26] - الهيئة العامة للتخطيط العمراني .(١٩٩٣) *الاسس والمعدلات التخطيطية* . القاهرة : الهيئة العامة للتخطيط العمراني.

[27] - الهيئة العامة للتخطيط العمراني .(١٩٩٣) *الاسس والمعدلات التخطيطية* . القاهرة : الهيئة العامة للتخطيط العمراني.

[28] Sharaf El-Din,Ibrahim. (2003). *Community Service & Globalization*. France: ISoCaRP (AIU) Congress papers.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Al Tagamoe El khames | 2175 | 358 | 16.46 | 235 | 10.8 | 593 | 27.26 |
| New Asyut | 1791 | 331 | 18.48 | 165 | 9.21 | 496 | 27.69 |
| New Alameen | 866 | 150 | 17.32 | 92 | 10.62 | 243 | 27.94 |
| Al Nubaria city | 1350 | 346 | 25.63 | 51 | 3.78 | 397 | 29.41 |
| Al Shrouq | 4500 | 1092 | 24.27 | 305 | 6.78 | 1397 | 31.04 |
| miate | 3662 | 717 | 19.58 | 390 | 10.65 | 1107 | 30.23 |
| **Average** | | **8684** | **12.5** | **4710** | **6.78** | **13395** | **19.28** |

In 2014, the General Organization of Physical Planning prepared a guide for the planning standards for services in the Arab Republic of Egypt. The most important standards and criteria were as follows:

• The average per capita educational services in the new cities reached about 1.6 m 2 / person, while the proposed rate of health services ranged between 0.2, 0.3 m 2 / person as well as religious services about 0.2 m 2 / person, and 0.3 m 2 / Social and cultural services including nurseries, libraries, cultural centers, care homes and accommodation establishments.[29]

• The per capita availability of recreational services and green areas reached an area of between 4 m 2 / person and 11.67 m 2 / person, the highest rate in a city, plus 4 m 2 / person green spaces between the houses and 5 m 2 as general recreational areas, which means about 20.7 m 2 / person Green recreational areas in each city.[30]

**5-2: Indicators of changes in service standards**

Upon comparing the standards of services established before 1990,1993 and 2014, a general trend was realized to reduce per capita basic services. For example, educational services were reduced from 2.85 $m^2$/ person to 1.6 $m^2$/ person in 2014. After the basic school area was about 5 acres in 1993, the standards that were issued in 2014 reached less than one acre and sometimes reach 2500 $m^2$. As well as health services, which have been reduced from 0.35 $m^2$ / person in 1993 to 0.25 $m^2$ in 2014.

In 1993 recreational services and green areas increased to about 20.7 $m^2$/ person instead of 6.36 $m^2$/ person in 2014. The following table (4) shows a comparison between service standards before 1993 and in 2014 in new cities.

**Table (4) Comparison of basic and recreational services before the year 1993 and the year 2014 for new cities.**

| Service type | $m^2$ per person before 1993 [٣٢] | $m^2$ per person [٣١] ٢٠١٤ | Exchange % rate | Type of change |
|---|---|---|---|---|
| **Educational** | ٢.٨٥ | ١.٦ | %٣٤ | - |
| **Commercial** | ١.٨ | ٢.٠ | %١١ | + |
| **Health** | ٠.٣٥ | ٠.٢٥ | %٢٩ | - |
| **Religious** | ٠.٥٥ | ٠.٥٥ | - | **No change** |
| **Social** | ٠.٤ | ٠.٣٥ | %١٣ | - |
| **Administrative** | ١.٣ | ١.٣ | - | **No change** |
| **Total basic areas** | ٧.٢٥ | ٦.٠٥ | %١٧ | - |
| **Recreational &Green** | ٦.٣٦ | ٢١.٧ | %٢٤١ | + |
| **Total** | **١٣.٦١** | **٢٧.٧٥** | **%١٠٠** | + |

[29] - الهيئة العامة للتخطيط العمراني.(٢٠١٤) *دليل المعدلات والمعايير التخطيطية للخدمات جمهورية مصر العربية*. القاهرة : الهيئة العامة للتخطيط العمراني.

[30] - الهيئة العامة للتخطيط العمراني.(٢٠١٤) *دليل المعدلات والمعايير التخطيطية للخدمات*-مرجع سابق

The comparison are done between the standards in the 90s period. It is noticed that, in 2014, a decrease of areas are observed per capita in educational, health, social, security and cultural services. While the standards of religious services have not changed and affected. It is noticed that, an increase in commercial services and recreational service standards. The level of total basic services decreased from 7.25 $m^2$/ capita to 6.05 $m^2$/capita while the total rate of recreational services and green areas increased to 21.7 $m^2$/ person instead of 6.36 $m^2$/ person.

**5-3: Indicators analysis**

As reference to the previous table which shows a comparison of basic services before the year 1993 and the same in 2014 for new cities. This period of comparison 1993 to 2014 showed rapid (TCT) technological developments which have its effects on the land use and areas of urban structure of new Egyptian cities. Also have changes of no. of services elements and locations. These changes can be analyzed as follows:

**5-3-1: Commercial services :**

• Change in the concept of trade and shopping to shift from traditional shopping to online shopping and contact elements. This concept will decrease the required areas for parking and some features of required buildings.

• Physical display areas are disappearing from the commercial services components to be replaced by internet pages. This had an impact on the commercial services, where the areas have turned into storage areas, which reduce required areas.

• There is no need for commercial services near the residential areas, but their location is closer to the production areas. Certain types of branches were distributed on the outskirts of the city or near the outside sites or outside the city limits.

**5-3-2: Educational services:**

Due to the changes occurring in the education learning styles, especially upon the rise distance learning, the areas and components of educational services will be affected at various levels. The need for classrooms is reduced, as well as some laboratory rooms and teachers in addition to services support; and thus the areas of educational services (buildings and land) is reduced. There will be no fixed location for educational services, which may be close or far away, but within the district or city or even in other cities or countries. and There will be less schools serving all ages from kindergarten to secondary, but there is a possibility of gathering educational services in locations close to educational departments.

**5-3-3: Administrative services:**

The use of e-government will be more common either for work or personal transactions. Accordingly, performance of works can be in two types: works that can be made from home, either by computer or mobile, and works that need administrative premises. Such premises can be of small area and will be located near the residential area.

**5-3-4: Entertainment and landscaping**

The green areas will be transformed into main axes which penetrate some areas of urban structure of the city. Energy sources will be one of the most important aspects of the city, whether in its surroundings, such as energy-producing roofs or elements such as wind trees. The rate of recreational services and green spaces will increase as a result of the rapid development of transportation and communication.

**Sixth: Results:**

TCT developments have been affected the urban structure of new Egyptian cities through increasing or decreasing some areas or location of its services structure which can be concluded as follows:

**Commercial services:**

Physical display areas are partially disappearing from some commercial services components to turn into pages on computer screens and phones, and this affects the commercial services, where the areas have turned into storage areas, which reduce required areas.

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[31] - الهيئة العامة للتخطيط العمراني.(٢٠١٤) *دليل المعدلات والمعايير التخطيطية للخدمات*-مرجع *سابق*

[32] - الهيئة العامة للتخطيط العمراني .(١٩٩٣) *الاسس والمعدلات التخطيطية* . القاهرة : الهيئة العامة للتخطيط العمراني.

**Educational services:**

Areas of educational services (buildings and land) will be reduced. There will be no fixed location for educational services, which may be close or far away, but within the district or city or even in other cities.

**Administrative services:**

The e-administrative services will make the use of e-government more popular either for work or personal transactions. Therefore, the areas required for administrative services will be decreased.

**Recreation services:**

The rate of recreational services and green spaces will increase as a result of the rapid development of transportation and communication. The green areas will turn into main paths that penetrate the urban structure of the city.

## Seventh: Bibliographies

### 7-1: Arabic bibliographies


١. د.البهنساوي، احمد علي سليم.(٢٠٠٨) *معايير تحديد الاهمية النسبية والدور الوظيفي للتجمعات العمرانية الريفية في اطار المخططات الاقليمية*. القاهرة: كلية الهندسة،جامعة الازهر.

٢. د.ابو سعدة،هشام. (١٩٧٧) *الكفاءة والتشكيل العمراني*. القاهرة: المكتبة الأكاديمية بالقاهرة.

٣. م.يوسف، وائل محمد. (٢٠٠٣) *مستقبل العمران في عصر تكنولوجيا المعلومات* . رسالة دكتوراه. كلية الهندسة، جامعة الازهر.

٤. ميشيو،كاكو. د.خرفان، سعد الدين (ترجمة).،و سونس،محمد(مراجعة) .(٢٠٠١) *رؤى مستقبلية – كيف سيغير العلم حياتنا في القرن الواحد والعشرين* . القاهرة:عالم المعرفة.

٥. كلو،صباح محمد. (٢٠٠١) تكنولوجيا المعلومات والإتصالات وانعكاساتها على المؤسسات المعلوماتية .*مجلة مكتبة الملك فهد الوطنية*. مجلد ٦، عدد ٢ ،٥٩-٩٣ .

٦. الهيئة العامة للتخطيط العمراني .(١٩٩٣) *الاسس والمعدلات التخطيطية* . القاهرة : الهيئة العامة للتخطيط العمراني.

٧. الهيئة العامة للتخطيط العمراني.(٢٠١٤) *دليل المعدلات والمعايير التخطيطية للخدمات جمهورية مصر العربية*. القاهرة : الهيئة العامة للتخطيط العمراني.


### 7-2: Foreign bibliographies


8. Adolphson, M., *Estimating a polycentric urban structure. Case study: urban changes in the Stockholm region 1991–2004.* Journal of Urban Planning and Development. Volume 135. Issue 19. March 2004
9. Richard Shearmur, McGill University, What is an urban Structure? The challenges of foreseeing 21st Century Patterns of the Urban Economy, 2013 – from Web site - https://www.researchgate.net/publication/297225871_What_is_an_urban_Structure_The_challenges_of_foreseeing_21st_Century_Patterns_of_the_Urban_Economy
10. BBC (2015) *Japan Fast Train* [Video Podcast]1 September. Available from: http://www.bbc.co.uk/arabic/multimedia/2015/04/150421_japan_fast_train [Accessed July 2015]
11. Marisa Cannon. Are flying taxis about to become a reality? CNN • Updated 10th September 2018 - https://edition.cnn.com/travel/article/uberair-flying-taxis/index.html - accessed 2018
12. ECER (2014) *Testing Aero planes with no Pilot* [Video Podcast] 22 February. Available from: https://www.youtube.com/watch?v=24YlgKuVtyc [Accessed July 2015]
13. BBC (2014) Britian Drivless Car. [Online]. Available from: http://www.bbc.co.uk/arabic/scienceandtech/2014/07/140730_britiain_driveless_cars [Accessed July 2015]
14. DW. (2014) *Floating Car TYP 166* [Video Podcast]1 September. Available from: https://www.youtube.com/watch?v=YruhE7EKGPU#t=66 [Accessed July 2015]
15. Agatha Kratz, Dragan Pavlićević, China's High-Speed Rail Diplomacy: Riding a Gravy Train?- Lau China Institute- Kings college - London - 2017
16. Sharaf El-Din,Ibrahim. (2003). Community Service & Globalization. France: ISoCaRP (AIU) Congress papers.
17. Sharaf El-Din, Ibrahim Hassan Ibrahim (1995) Spatial Structure of Services for Urban Communities "The Impact of Spatial Patterns on Services Standards for new communities in Egypt. PhD, Zagazig Universt