

## The necessary factors in formation of new transportation systems in sustainable development condition

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**Abstract:** Sustainable development derives from a holistic discipline that all of its aspects must be considered. Transportation as one of effective sectors on economy should develop aligned with other socio-economic sectors. Since a strong correlation exists between transportation efficiency and general efficiency of economy. In The process of socio-economic development in different countries a positive and direct correlation is between expansion of transportation and achievement to rate of economic growth. In other words, along with increase of GDP, value added rate of the transportation sector maximizes as well, that is why economic growth and development augment based on development of the transportation sector and transportation activities are known as fundamental activities for economic growth and change. The present paper is an attempt to review the existing literature in case studies of other countries in relation to modeling, establishment and development of new transportation system in condition of sustainable development. The mentioned case studies in the present study are presented with reliable resources. The main conclusion of the current research is determination of value added factors, employment, development of business and industry as necessary factors in formation of new transportation systems in the sustainable development condition. Therefore, for a quantitative understanding and making a scientific conclusion, some suggestions are offered in final section in order to explain scientific relationship between these three variables with new transportations systems in the sustainable development conditions.

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Key words: sustainable development, economic development, indexes of sustainable development

### 1. Introduction:

In The process of socio-economic development in different countries a positive and direct correlation is between expansion of transportation and achievement to rate of economic growth. In other words, along with increase of GDP, value added rate of the transportation sector maximizes as well that is why economic growth and development augment based on development of the transportation sector and transportation activities are known as fundamental activities for economic growth and change (Zhang, Wei-Bin, 2013).

If transportation services in the world today are called industry is an indication of significance and broadness of these services as a link between different industries together and a mediate factor among consumer markets and production markets. Accordingly, connection between the transportation system and other socio-economic development process in different countries are so critical and sophisticated that economic experts recognize the transportation industry as driving force of development and state that efficiency and capability of this industry ground for sustainable development (Nannan, Yu, et. al, 2011).

If by development we mean expansion of living facilities, this issue is true not only about the current generation but also about descendents. Sustainable development, in fact is a new meaning derived from economic growth. The growth that brings about

justice and living facilities for entire world not just a limited number without any damage to confined natural capacity and resources (BIONDO, Alessio Emanuele, 2010).

Transportation as one of effective sectors on economy must grow in line with other socio-economic sectors, since there is a strong correlation between its efficiency and general efficiency of economy. With sustainable growth of production and world trade, demands for transportation increases as well. As production and transporting the products to the market is pretty unattainable.

Therefore, one of the most critical basic needs of human being, which has become widespread and today's are realized as an appearance of modern life and civilization is transportation. Even, some economic experts identify transportation as body of development (Epure, Marcel, 2013). If we review the history of Europe economy during 1870s on, we will realize that transportation system has faced with intense transformations.

In this time period, two events coincide in the industrialized countries. In one hand new technologies have provided conditions for industrialized countries to be able to produce bulk commodities. And in other hand, technology prepared conditions for development of transportation industry and acceleration of business. These two settings are recalled as the principle factors to make economic sustainable development in

the continent (POPESCU, Alexandra Mihaela, et. al, 2013).

the present research aims to investigate factors are influential on formation of the new transportation systems in order to examine their general function in condition of sustainable development and finally provides the obtained results from the relationship between new transportation systems with sustainable development.

## 2-review of the related literature:

### 2-1: definitions:

**Sustainable development:** sustainable development is change in utilizing resources, investments, and direction of technological advances as well as an institutional transformation that are consistent with present and future needs (Liedtke, Christa, et. al, 2013).

**Economic development:** it consists of economic growth with fundamental changes in economy and increase of production capacities including physical, human, and social capacities. In economic development, quantitative growth of production will result, though social institutions will face with some transformations (Juita-Elena, Yusuf, et. al, 2013).

**Economic growth:** by economic growth it simply means any increase in production of a specific country in a specific year compared to the same value in the base year. In macro level, increase of GNP or GDP in the studied year in comparison with the value in the base year is called economic growth. The reason for using prices of the base year for calculation of economic growth is that computed increase in GNP is due to increased rate of production and the impact of inflation is eliminated (FaridSaymeh, Abdul Aziz, et. al, 2013)..(

**Indexes of sustainable development:** defined as total average of economic, social and environmental indexes (Abou-Ali, Hala, et. al, 2013).

### 2-2 research background:

(Timothy, Garceau, et. al, 2013), this paper uses an existing framework that encapsulates the concept of transportation sustainability to evaluate selected economic, social and environmental costs of automobile-oriented transportation systems as measured by rates of vehicle miles traveled (VMT) at the state-wide scale across the United States. States with higher percentages of commuting using private vehicles have higher rates of VMT per capita, higher carbon emissions, and pay more for transportation at the household level. (Feitelson, Eran, 2002), the paper explores the multiple facets of the meaning of environmental equity in the case of transport. Then, the issues that need to be addressed in any analysis of each facet are delineated. On this basis it is suggested

that the conventional environmental equity analysis, whereby the affected areas are compared to unaffected areas, is unlikely to render robust or meaningful results. (Teodor Gabriel Crainic, et. al, 2009), The paper reviews main issues, technological challenges, and achievements, and illustrates how the introduction of better operations research-based decision-support software could very significantly improve the ultimate performance of Freight ITS. (Robert H. Williams, 2001), this article describe, radical change in the energy system is essential in the decades immediately ahead in order to address effectively the multiple economic, social, environmental, and insecurity challenges posed by conventional energy. (Kusakabe, Emiko, 2013), this paper examines in particular the workings and effects of community networks in targeting sustainable development at the local level; it looks at three examples of current action towards sustainability in Japanese cities, focusing on social capital networks and the role local government is playing in the process. (Jason Zheng, et. al, 2013), they begin by reviewing the existing literature on indicator selection criteria, examining the construction of composite indices, and exploring existing rating systems. Building on this knowledge, we describe the process for creating a systematic tool for assessing sustainable transportation called the Transportation Index for Sustainable Places (TISP). They also provide an example of one element of the TISP to illustrate the necessary steps involved in the ranking process.

### 2-3: theoretical framework:

Sustainable development has some difference with economic development that a few of them are mentioned as follows:

-in field of sustainable development, the development itself becomes a cultural process and instead of reaching short-time consequences, the objective is to make a cultural relationship between the environment, human and development program.

-according to economic development, natural and production capital are interchangeably used and technology can compensate any decrease in natural resources. Contrarily, sustainable development believes in this issue that technology is irreplaceable with most of natural functions.

- the component-oriented approach in economic development, considers man and the environment as two independent phenomena that accordingly plans and design to put these two elements before each other. However, in view of sustainable development, a holistic theoretical and intellectual basis dominates.

-education in the sustainable development is schooling through direct and active participation on the basis of holistic view. Components of such

development must be realized in form of distinct and understandable institutions. This education in one hand should include policy makers, decision makers, planners, designers and executers. On the other hand, it finally contains those who make development happen, people.

-foundation for sustainable development stands on logical usage of the environment and natural resources. This issue involves attention to generations' needs; sustainable development highlights within its culture inter-generation and intra-generation justice together and pays special attention to equilibrium criteria in exploitation of natural resources.

-sustainable development due to its fundamental need to public participation, requires unity, social solidarity, justice, and balance. This manner without presence of any social justice and elimination of poverty in the society as well as fair distribution of facilities in the community is far to reach.

-in sustainable development viewpoint, value of all social costs and benefits such as depreciation and valuation of natural resources, pollution and environmental degradation have to be included in the accounting system thanks to determination of the role of development. Since markets are not efficient enough in this regard, thus government must interfere here.

### 3-Materials and findings:

#### 3-1-Position of transportation in the green economy:

The problem of transportation and traffic that has to do with socio-political phenomenon play an increasing critical role in socio-economic quality and structure of a society and shape a foundation for modern urban life besides displacement of people. In the process of urban development boundaries of transportation system development, application and use of urban planning principles in addition to traffic must be specified. In this regard, sustainable transportation is one of fundamental problems in the green economy approach. Significance of the transportation system in sustainable urban economic development is identifiable from two dimensions as follows:

Aspect 1: it relates to major role of the transportation system in the environmental effects like greenhouse gas emission, air pollutants, noise pollution and fuel handling due to achieving transportation infrastructures, sustainable development and more effective use of invested resources in the infrastructures.

Aspect 2: it refers to important role of the urban transportation sector in employment and economic development. In most countries jobs in the

public transportation sector occupy between 1 to per cent of total national employment.

#### 3-2: sustainable transportation:

Sustainable transportation refers to flowing movement of transportation vehicles, people and goods that involves people's relaxation and sustainability of the environment with the most reasonable costs and endeavors. A modern city must possess an efficient and extensive transportation system for making connection, and having access to different regions. In the World Bank report (1996) describes sustainable urban transportation and its components as follows:

-economic and financial principle that consists of appropriateness of organizational structure actions and investment for transportation infrastructures

- Ecological principle that includes evaluation of methods for investment in the transportation industry and selection of different forms of transportation which are influential on reduction of energy consumption and emission of pollutants.

-social principle that emphasizes on sufficiency of access to transportation services for all social classes

Today's, in cities which unsustainable transportation systems are extending and transportation development often is incorrectly known as activities like building bridges, widening roads and creation of rapid transportation system. however, sustainable development contains all of these techniques, it calls a sustained transportation only when thoroughly embraces all socio-economic and ecological aspects, minimum rate of need to travel, fitting the needs of all segments of society, using transportation methods with the least adverse environmental impacts and use of financial and human resources are intruded as diverse dimensions of a sustainable urban transportations.

#### 3-3: intelligent transportation system and sustainable development:

A large number of intelligent transportation systems have been recorded so far, though due to their new appearance no exact definition has been presented until now. According to the definition was stated in 1988 by ITS America about intelligent transportation systems (ITS) that was generally accepted" people utilize technology in transportation for saving time and money in the everyday's life".

In another formal definition was reported in April 1999 by U.S. department of transportation "the intelligent transportation systems collect, maintain, process and distribute information related to displacement of passengers and goods". Knowing about application of ITS causes to understand this concept better and classify its application into two

main categories of intelligent infrastructures and intelligent vehicles.

In Sydney this system has been successfully by setting lights for years pass traffic near to freeway traffic through a city street. In Japan using equipments inside the transportation vehicles to help drivers in directing toward their destination has been spread. Nowadays, equipments inside the transportation vehicles in the U.S. is getting larger and operates on the basis of GIS and digital maps.

Combination of ICT with the transportation system in the developed countries has lead to appearance of intelligent transportation systems

(ITS). Indeed, ITS is a series of technologies which transforms procedure, structure, designing and management of road transportation systems. Significance of ITS is to some extent that in the transportation structure of the developed countries an independent national organization naming ITS has been established. The role of governments in regard to ITS is in two creation of infrastructure and execution sections. As a result, many different systems are involved in success and implementation of the intelligent systems of transportation. Table 1 shows some of them.

**Table 1: new intelligent transportation systems**

Maintenance and operation - Events Management - Announcing the a collision - Control video	Emergency Management - Electronic Payment - Traffic counter - Road safety and security	Collision warning - Atmospheric Administration - Detector - Passenger information	Arterial Management Freeway management Assist the driver Traffic Management
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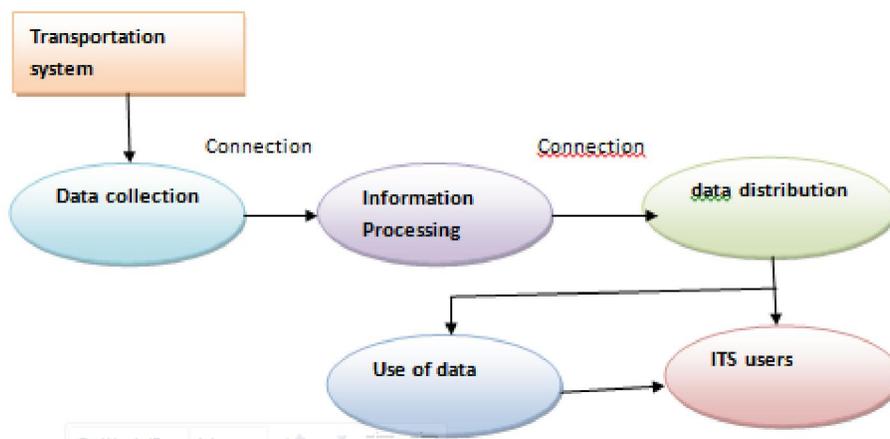
Not using these intelligent systems leads to many financial and life loses in different countries that in most cases precise examination of such loses is relatively impossible. In the European roads annually more than 40000 peoples lose their life and road accidents charges a cost of 200 million Euro to the EU economy (Commission Communication on European Road Safety Action Programmed). This rate of accidents in Iran is also extremely significant in a way that annual cost of road accidents is about 7% of the country GDP. ( Ayati, 2009).

Analyzing causes of road accidents in Japan reveals that about 50% of life loses were due to delay in making a driver’s diagnosis. Therefore, in Japan the automatic system of highways was launched. Using this system will reduce the rate of accidents

about 80% and minimize them significantly ( Isaei, 2005).

Lack of using the new transportation system not only ends to the economic losses but also interrupts in the process of economic growth and development especially life losses). Therefore, the developed and under developing countries place a special attention on modeling, establishment and development of the intelligent systems for removing obstacles before sustainable development.

In an ITS system through applying information and control technology, required information chain for providing services between the transportation system and ITS users has been created. Fig. 1 illustrates the relation of these technologies.



**Fig. 1: relationship between transportation system and ITS users**

Generally speaking, studies in field of the new transportation system indicate that essential factors in formation of the new transportation system consist of value added, employment, development of business and industry. In following some examples are provided.

1-value added of the transportation sector in the country like other economic sectors includes two major components of value added and intermediary cost. That is value added difference is economically called value added of that sector).

2. value added in the transportation sector of Iran on the basis of fixed cost year 1997 during years 1995-2005 ( except for 204) experienced a regular ascending process with growth rate of 75.1%. The sub-sector of the road transportation showed an average annual growth rate 4.6%, however, the transportation sector in the same period indicated a 5.8% growth and for road section a 5.7% growth rate per year ( Nosrati et al, 2011).

3. The infrastructure sector not only has created jobs and services but also has contributed to development of other economic sectors like agriculture, industry and services. As a result, if this key sector leaves behind other economic sectors, it is counted as one of obstacles in the process of economic growth and development ( Faroughi, 2010).

4. economic growth of newly emerging economic in southeast Asia such as Taiwan, south Korea, Singapore, Malaysia and Hong-Kong, through development of experts has been produced that in much extent in indebted to investment in infrastructures and equipments in the transportation sector as well as development of transportation management skills. Therefore, by benefiting from transportation in field of business due to gaining more benefits, achievement of sustainable development is not far reaching ( Behzad Far, 2011).

#### 4. Conclusion:

Planning on Sustainable transportation for moving people and goods involves taking into account seven factors as higher capacity, higher speed, lower cost, lower power consumption, using clean energy, and safe and comfortable trip. Achieving these conditions and improvement of the transportation systems requires fundamental studies on financial resources, infrastructures; growth of population and structural problems and experiences of other countries greatly contributes in finding the favorite position and comparing developed and under developing countries better reflects existing changes.

Economic growth and development is among ideals many countries struggle to achieve them.

Providing public welfare is rooted in history that different countries have been following it for years. Today's no program without presence of economic development is imaginable. Therefore, getting more economically developed has become an undeniable reality of the modern life.

One factor plays a crucial play in achievement to economic growth is dynamic transportation. This fundamental sector not only creates job in itself but also is effective on development of other economic sectors like agriculture, industry and services, therefore, if this key sector cannot develop along with other economic sectors, it defiantly will function as one of important obstacles before economic growth and development. Having a dynamic and organized transportation system is one of chief criteria in measurement of level of development countries in the world today. Accordingly, a society benefits from an efficient transportation system will also be qualified for comprehensive development. Importance of the transportation system in socio –economic and political structures of today's world is extent that experts realize it as the foundation for sustainable development.

The main conclusion derived from this research is determination of factors of value added, employment, commercial and industrial development factors as vital components in formation of new transportation systems in sustainable development. Therefore, for having a quantitative understanding of this conclusion, some tips are suggested for future studies as below.

- Recommendations:
- ✓ Examination of relationship between new transportation systems and economic value added
- ✓ Examination of relationship between new transportation systems and growth of employment
- ✓ Examination of relationship between new transportation system and business growth

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