

The readiness of employees for the future society. Case study

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Abstract. *The main components of sustainable development – economy, ecology and equity – have a special significance to contemporary cities, given their huge consumption and distribution of goods and services, with an ecological impact exceeding their own location. The sustainability challenge to cities, going hand in hand with the quality of life, makes it necessary to consider a series of social, economic, ecological, cultural, political and institutional measures adapted to both global trends and local characteristics.*

Based on these overall considerations this paper aims to investigate the implications of smart solutions for sustainable city development and to gauge the readiness of employees for smart solutions. These solutions concentrate on the core area of the city administration, education, health, transportation, etc. With this purpose in view, the framework for a case study is built up employing a quantitative and qualitative research for a mid-sized Romanian city. Exploratory research techniques combined with applying a survey methodology have been used for studying the preparation of employees for the smart solutions. A set of derived procedures have been employed for collecting and analyzing more than 400 observations from a heterogeneous population. They have been correlated with indicators able to characterize the sustainable city development, so as to point out the impact of the smart solutions and the possibilities to use their facilities in this respect. The results show that

smart solutions are highly recommended for the future sustainable development and they are almost ready to penetrate the city from a technological perspective but information and understanding of citizens with regard to this new way of evolution are still lacking.

Keywords: sustainable city; smart solutions; indicators; social impact; readiness of employees.

JEL Codes: R15, O30.

REL Codes: 8E, 18D.

1. Introduction

The last century has recorded an explosive growth of population in cities (Figure 1), more than 50 percent of the world's population living in urban areas (Leeuwen, 2006, p. 268). Urbanization is the most important social process that influences the economic development and the state of environment. As a result, the world must invest in finding new solutions for development without disturbing the environment.

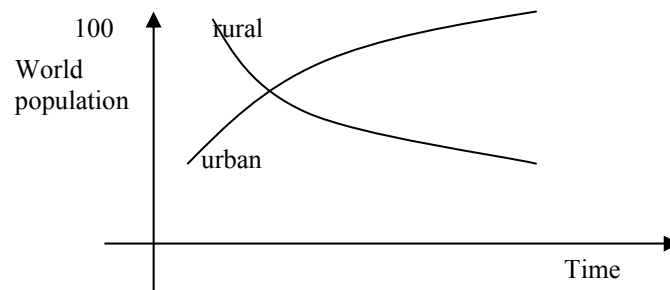


Figure 1. *The urban explosion*

In this case the main components of sustainable development – economy, environment or ecology and equity – have a special significance to contemporary cities. For cities it is very important how they manage environment, infrastructure and resources.

The city development involves factors such as the economy of the city and the availability of jobs and services, the health and attraction of the urban environment, the availability of resources, such as water, materials and energy, as well as space for growth. All of them can be realized having in view the technological progress.

For sustainable urban development economic, environmental and social development must be considered, implying the use of modern solutions and technologies. This can be translated into systems and technologies which are open, dynamic and integrated like smart solutions. To date, the implementation of smart solutions for cities represents a necessity and a real support for sustainable urban development. Through them the city development in economic and social terms can be supported without disturbing the environment.

Our paper proposes an empirical analysis aiming to investigate in what extent the population/employees in a mid-sized Romanian city is prepared for implementation of this type of solutions, based on the fact that internet communication has become a constant of their everyday life. With this aim in

view, the paper first discusses the main co-ordinates of the urban sustainable development and the priorities of smart solutions for sustainable cities, followed by the discussion of the case study performed.

2. Sustainable urban development

Today urban development is a major global issue that requires urgent attention because of the intensification of human activities that want only use natural resources and degrade the environment. The urban development is related to the quality of life and in a smart city the economic, social and environmental systems are providing a healthy, productive, good life for all the citizens.

We can say that urban development is a complex system that concerns the entire economic, social, and cultural sectors from the city.

One of the major problems of the current economy is to use resources efficiently. This principle requires the conservation and rational use of renewable resources, as well as balancing the pace of exploitation of other resources and their regeneration rate. An effective solution requires that everything is taken from nature to be used and useful substances from waste and used goods to be recycled. Here we can see that it is necessary to use new information technologies to ensure efficient use of the resources.

Sustainable urban development is defined (Hald, 2009) as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The future city has been recognized as a new stage of urban development in which we use the resources and the environment efficiently. Because of different development of cities of the world we can't have the same strategy for all the cities.

3. Smart solutions for sustainable cities

Smart solutions may be regarded as a collection of new technologies and applications, which enable the processing, storing and transfer of information and knowledge to a wide variety of users. In our age these solutions have a major impact on human life and future development of society. Starting from this kind of technologies and applications, a lot of ideas about the new image of the city or smart city can be identified, as published in many books, articles and papers. Such studies highlight the solutions for city development by means of new technologies.

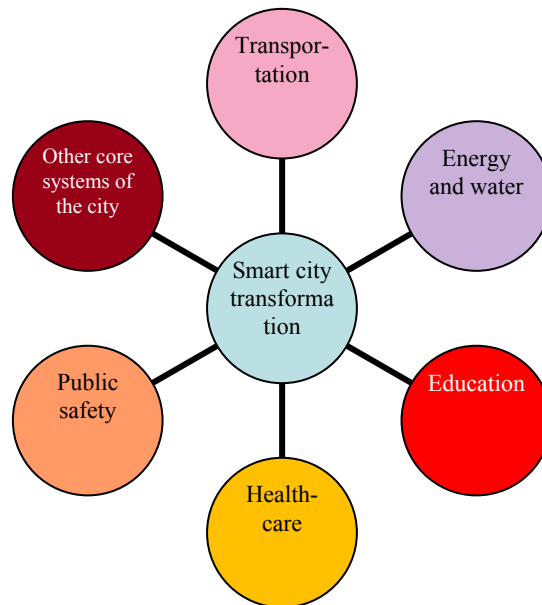


Figure 2. *Smart City – a system of systems*

Top priorities for cities include sustaining water, energy and food supplies, managing waste and reducing greenhouse gas emissions (IBM, 2010). Smart city transformation has in view these priorities. In the cities where smart solutions have been implemented inhabitants consume less energy and space for living and make more activities with the same quantity of energy. In our view smart technologies represent a good solution for sustainable development of the city. The smart city can be regarded like a *system of systems* in which the city integrates all entities to achieve a new efficiency level.

The smart city can integrate and optimize all the systems to achieve a new level of productivity, quality and efficiency. A smart city is based on the use of new technologies in all activities for improving the quality of work and of life, to reduce costs and to improve the efficiency.

The smart city has been acknowledged as a new stage of urban development (IBM, 2010, Muyuan, 2011, Pike Research, 2010). Its construction has become an international concern. Solutions for all the cities to become smarter can be found, but cannot be the same solution for all cities. To implement a smart city the top priorities have to be considered.

These new technologies are still an understudied field. We can identify very few exceptions in which the smart solutions have been growing in some city without the help of local authorities. So, we can say that is very important to imply all the sectors from the city in this direction.

New technologies are the central element for sustainable development in our time. Smart systems represent a central nervous system of the modern society: communications, government functions, information gathering and business activities all depend on access to information and internet. Without these smart systems, individuals and firms could not function efficiently.

4. Case study. Methodology

4.1. The methods used for data collection

The survey concentrated on the core area of the city administration, education, health, transportation, etc. This was performed among the employees for a mid-sized Romanian city Râmnicu Vâlcea in order to investigate three main issues:

- the use of present communication infrastructure; how employees perceive the use of on-line solutions in their activities;
- how existing communication infrastructure is used for employees activities;
- if the employees consider beneficial the relationship established between companies through smart solutions.

The survey consisted of 18 questions targeting the following categories:

- general information about the employees: age, gender;
- questions regarding how existing communication infrastructure is used for their activities;
- questions regarding how on-line communication changes employees relationship; they aim to check whether the employees are interested in on-line resources as well as the major advantages and disadvantages of using on-line system;
- questions regarding how employees are interested in working on-line;
- questions regarding how employees perceive the relationships between companies through smart solutions.

The methodology is based on primary collected data by means of a collective survey which contains a mixture of close and open ended questions. For data collection structured interviews were developed using a given questionnaire format.

4.2. Participants

The subjects of the survey were selected from employees of a mid-sized Romanian city Râmnicu Vâlcea. The respondents were selected among the employees of the public sector. A set of derived procedures have been employed for collecting and analyzing more than 400 observations from a heterogeneous population.

By gender, the sample population is distributed as shown in Table 1. There are more male employees than female. The distribution is representative for the general population of the city.

Table 1

Sample distribution by gender	
Gender	Post-Test Mean (%)
M	57
F	43

By age, the distribution of the sample population is presented in Table 2. The majority of the employees have between 35 and 45 years of age. The number of the young employees is very important for our survey, because they are more open to changes and new solutions.

Table 2

Sample distribution by age	
Age	Number
25-35	128
35-45	167
45-55	80
more then 55	25

Most of employees are young. The distribution of employees by age highlight that the number of those who have interest in new technologies is the most important. They are also the people who learned in school how to use Internet and new technologies for improving communications and other activities.

5. Case study. Analysis

The study approached three directions and for every part we elaborated a set of questions. The results are presented for each of the three categories of questions: the use of present infrastructure, on-line communication between employees, using the new technologies for relationship between companies.

5.1. The use of present infrastructure

The first set of survey items relates to the hardware and software conditions, the survey revealing that all the employees had access and used the communication infrastructure. They use the software and hardware infrastructure from work-office often than home.

Table 3

Frequency of use and percentage of users	
Frequency of use	Percentage of users
Always several times a day	67.81
Several times a day during the end of the month	3.83
Several times a day during the projects	28.36

A special importance should be given to the frequency with which the employees return to the internet for communication, documentation and information. The employees used frequent several times a day communication infrastructure (Table 3), confirming the need for correlation with the economic reality.

We must to highlight the large number of employees who use the internet for communication, documentation and information (78.34%), for training (13.16%), for links to other organizations (9%) (Figure 3).

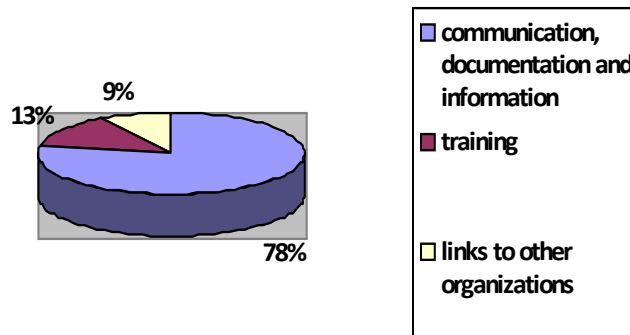


Figure 3. Internet services usage

Analysis of responses highlight that the employees use the hardware and software infrastructure at work and smart solutions will improve their activities.

The employees revealed that new technologies have changed the way we inform, entertain and educate ourselves, as well as our ways of working, carrying out research, doing business, and keeping in contact with each other.

We can specify that the new technologies (Fernández-Maldonado, 2005, p. 2) have become pervasive in developed countries and increasingly present in cities of the developing world, while each year thousands of new digital devices and applications are brought into the market and into the hands of millions of people.

5.2. On-line communication between employees

On-line communication is one of the most important facilities of information technology age for the employees around the world. It changed the human life by making it easier to communicate between each other. Employees now communicate between each other's by different ways in comparison to the past. As a result businesses also change and develop by using communication technology. The employees of the public sector have many benefits and many barriers by using communication technology; the discussion will be limited to this area.

According to the answers, there are a very large number of employees who believe that the online communication is essential in their work and interaction with other employees (98.99%). We believe that this attitude reflects the openness to new technologies or smart solutions. The large number of those who believe that the relationships between employees are improved through on-line communication (Table 4) helped us to conclude that the use of smart solutions would be of a real support for them.

Table 4

On-line communication	
Communication	Percentage
Improved	91.46
Unchanged	8.42
Worse	0.02

The responses also show that the on-line communication is considered essential by the majority of employers in terms of reducing time, costs and of linking the activities of organizations.

Users also highlight the possibility of obtaining additional information on a particular topic through on-line communication with other employees, this helping them to improve their knowledge.

In the open question related to the disadvantages of using on-line communication solutions the responses could be grouped in the following categories:

- Accessibility – some employees have highlighted the difficulty of connecting to the internet in some areas.

- False identities – they said that on-line communication does not allow people always to see each other.
- Time – even if in more situations the on-line communication reduces the necessary time, the employees highlight that there are some situations in which one person wait a few hours or even a few days for receiving an answer.

We must have in view the disadvantages for employees regarding the use of internet and on-line communication because all future solutions are based on internet and communication.

The first disadvantage regarding using internet in workplace for a long time highlight by employees is that it could be affected body and brain health. The second disadvantage is that employees can use company computer for dubious purposes. But the advantages are more important, so it is essential in our age to use on-line communication between employees.

5.3. Using the new technologies for relationship between companies

On-line communication can help companies to communicating effectively with clients and employees. Also companies can use it to build a good relationship with their customers. Now most companies public or private provide a website to market their goods and give more details about company's business. Most companies use now on-line communication to produce or exchange new information.

The first question of this part envisaged the importance of linking the companies with the economic reality. Most employees (99.18%) have stressed the interest in real examples of other companies for the same problems they have.

When asked if they prefer to work on-line the majority declares that it is very useful to work on-line. In this case they will generate less waste and on-line communication is a real support for future work (97.32%). The new technologies are viewed as a solution for generating less waste and for protecting the environment.

The last question is one that stresses the need for a smart solution to enable the communication between companies. The analysis of responses highlights that the employees think that through smart solutions can be linked all activities from organizations and between them. These solutions will reduce the need for use of natural resources and this is the first requirement for creating a more sustainable and smart city.

6. Conclusions

Urbanization is a real issue for our society. Therefore a series of environmental problems as well as social and economic problems characterize the cities of our age. Investing in technological progress for developing cities and for solving the environmental challenges will remain a priority for authorities. A coherent urban planning is required in this respect, starting from a realistic analysis of the current situation.

Our analysis investigated the preparation of employees of a city for smart solutions, revealing that through on-line communication and smart solutions the relationship between employees is improved and all activities will be linked and automated.

The efficient manage of data and information using new technologies is a solution for innovation, competition, and productivity.

From on-line communication which offers us a lot of information we can select, using the decision based by our knowledge, the useful solutions and we can produce new knowledge and innovation.

In an economical crisis the need for knowledge and innovation is higher as ever and the analysis of prepare of employees to the use of smart solutions is very important.

Acknowledgements

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