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## **Smart economy- the potential of digital infrastructure for the circular economy**

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### **Abstract**

The digital era creates the resettlement premises on new foundations of the economy, restructuring the urban organization and changing the vision upon the needs and the lifestyle of human beings. The Internet of Things offers a new type of infrastructure that connects the function with the evolution of the economy and urbanization, based on circular economy. *Smart economy, smart city* and *smart citizen* are several new concepts that allow us to anticipate the transformations of human civilization, which will come in the near future.

Key words: *The Internet of Things, smart economy, smart city, smart marketing, digitalization, resources.*

**JEL Classification:** I25, M 310, O 440;

### **1. Introduction**

The depletion of natural resources, the increasing pollution of the planet, in the context of population growth, and also social disparities of growing polarization of wealth ownership are so many vulnerabilities in the evolution of humanity who can find solutions in the informational society.

The digitization of human activities by expanding global *Internet of Things* may allow strict monitoring of products throughout their entire life cycle. Therefore, a new conceptualization of waste management will be soon achieved. Basically, we head towards a circular economy in which, the resources recovery belongs, by default, to the use of the certain products. It is possible that, in the context of a digitized economy, of the smart economy, the used articles/products won't be thrown away anymore, as it happens today, but they might enter into the circuit of reuse resources. Consequently, a new type of system management of what we now call "the waste" will begin.

## 2. The concept of Internet of Things

The *Internet of Things* will provide a digital infrastructure that can lead us to a real implementation of a circular economy. This will allow a more efficient use of existing resources. In this sense, the digitization will release new resources for the functioning of the economy and will have a significant impact in improving environmental protection.

If today's networks of power transmission in urban areas have to travel long distances and record losses of almost 30% (Ristea, Valeriu, 2010), the *Internet of Things*, applied to an urban scale, can provide management for more efficient energy flows and its consumption.

Nowadays, a new vision of urban development starts to flourish. This will connect the architectural concepts and energy efficiency of material use, having the *Internet of Things* as the urban infrastructure. Construction materials will be reusable, particularly those that ensure maximum energy efficiency. The architectural concepts will not only have aesthetic value, but they will also incorporate solutions for power generation (including the use of solar and wind powers). Roofs, exterior walls and even windows will represent innovative solutions for creating a more sustainable and environmentally friendly way of living and construction. Therefore, they will be implemented in accordance to energy production.

The *Internet of Things* will enable intelligent networks of energy management. As a result, the smart cities' citizens will benefit from the reduction of the utility bills by up to 25% (Hrebiniak, 2011). Moreover, the digitization will reduce the maintenance costs of energy networks, also both the fast identification of errors and the solutions in case of emergencies.

The *smart economy* operation is facilitated by the smart urban concepts expressed by the smart city and, at the same time, the efficiency of cities seems to depend on the implementation of the *Internet of Things* at each household.

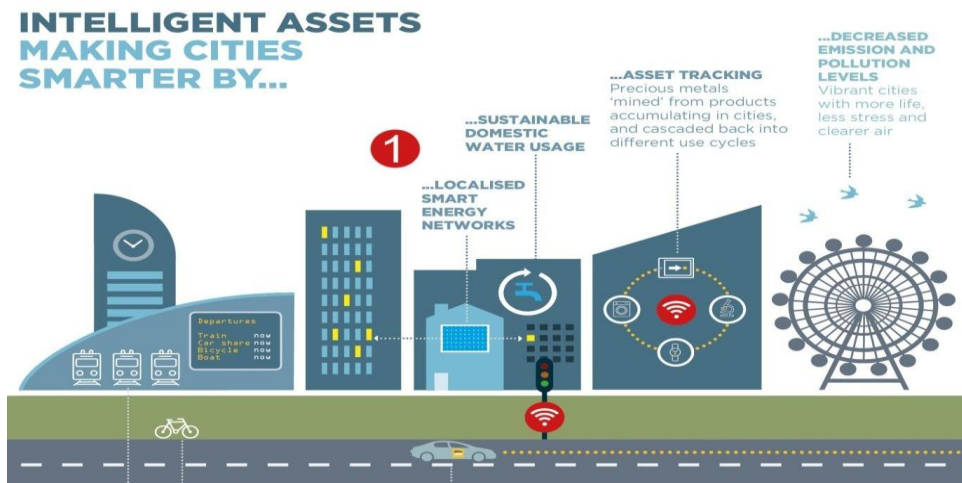
An intelligent house can enable considerable reductions in energy consumption by installing smart thermostats and thermal power generation, scheduling and placement of appliances according to human needs, inside the house. This will eliminate the possibility that an empty house will be heated unnecessarily. Also, digitization will enable appliances to operate in hourly sections where energy is cheaper or where it is produced from renewable sources.

Smart appliances will be able to orient its use in optimal ways (for example, an intelligent washing machine will have programming options to match more operating instructions and eliminate unnecessary consumption). They may signal the exhaustion of consumer goods (for example, a smart refrigerator monitoring steps in ending stocks of food) and may assure, depending on the method of programming, acquisitions of goods, according to our needs, which will generate a reduction of time for shopping, as well as their costs (Smart shopping will be done under the most advantageous costs). What will happen to the big shopping centers today, remains an open question to answer.

Smart buildings can be more effective, not only in terms of power consumption and design of special materials, but also in terms of flexibility and space management. We should wonder why most of the buildings, on average, are used for only half a day. We spend half of our time working in offices and half in our residential

spaces. From a certain perspective, you could say that most of the buildings are about for a half a day, unused or partly used.

At an urban scale, the *Internet of Things* can provide highly efficient solutions for traffic congestion. Currently, a driver consumes 15% of his time in traffic, being stuck in traffic jams or up to 20%, searching for a parking space (Lendrevie, Lindon, 1997). Digitalization will provide real time information on travel alternatives and, consequently, will save the citizens of the over wasting their time and fuel. With more free time and more money, the citizens from larger urban centers will have access to a higher quality of life.



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In the case of street lighting, the use of intelligent solutions whereby light sources will be activated only in times when human presence is detected, enabling significant energy savings, without abandoning the exigencies of public safety.

Digitization will lead to the development of huge urban centers that will have a smart economy. It will not only develop new types of business, but also a new way of doing business that is taking into account a new type of communication. The *Internet of Things* will stimulate communication between objects, digitally connected and reporting a new relationship between them and human intelligence.

Artificial intelligence will reshape the structure basis of which we cannot yet predict and see its own evolution. Communication between human and artificial intelligence will find, in the near future, significant changes and a new layout of epistemic terms.

If, until now we talked about opportunities and about a new network resource management perspective offered by digitalization, we should also give and insight of the possible vulnerabilities that can be engaged.

There are at least two problems that can be anticipated in terms of globalizing the digitalization: ensuring the privacy of human activities and protection of digital systems.

In general and individual activity, the digitization of economy raises important issues related to ensuring the privacy of communication. An economy will require performant intelligence solutions for

identifying communication channels to ensure the privacy of organizations' activities. An intelligent house will require a new vision of personal information and the smart objects will communicate with global infrastructures, data about needs and the individual lifestyle.

Also, evolution and artificial intelligence will impose new standards regarding protection of digital systems from both legally and technologically perspectives.

### Conclusions:

1. Although it is not known exactly how it will be called: the fourth industrial revolution, the information society, the digital revolution, it is obvious that humanity is on the brink of a new era. What we know already is that with the present human intelligence, a new form of intelligence, the artificial limits have exceeded physical reality through a new kind of reality, the virtual one.
2. The *Internet of Things* offers integrated digital infrastructure that enables placement on new bases of all human activities and to relate the concepts of *smart economy*, *smart city*, *smart home* and *smart citizen*.
3. Digitization offers new opportunities for development not only of the economy, efficiency and cost reduction of energy consumption, but also new solutions for solving resources crises by creating real conditions for the implementation of circular economy.
4. The digital revolution must be approached not only from the perspective of the advantages it brings to the human being, but also from the vulnerability that causes it. Preserving the privacy of digital communication and digital protection systems are just two of them, considering that we don't have yet reasonable anticipations on big structural changes of human society and of the evolution of artificial intelligence and communication between human and artificial intelligence.

### NOTES:

1. <https://www.weforum.org/agenda/2016/02/4-ways-smart-cities-will-make-our-lives-better/>
2. Ibidem.
3. Ibidem

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