

Education & Smart Cities: The Role of the Goals of Agenda 2030 for Sustainable Development of Smart Cities

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ABSTRACT

Digitalization is one of several megatrends, including globalization, demographic change and climate change that are reshaping policies from the ground up. For two decades, digital innovation has been at the heart of discourse around “Smart Cities” to build more efficient and livable urban environments. The concept of “Smart City” has been developed to promote the Sustainable Development of a city. Smart city is defined as an enhanced learning and innovative small society, based in digital tools and services of high quality for its citizens. The European Union (EU), in order to achieve economic growth and its dominance on the global market, has prepared a comprehensive development program, which initially was the Lisbon Strategy, then the Strategy Europe 2020 and now is the Agenda 2030. In these programs, there has been given a strong emphasis on Smart growth, which was mainly achieved through the transition of cities to the digital era with the concept of Smart City and promoting quality education to all citizens. Quality education (SDG-4) is the 4th goal of the Sustainable Development Goals (SDGs) of Agenda 2030, which demonstrates the interaction of education with Sustainable Development and consequently with the promotion of the concept of the Smart City. In this paper, the role of education for sustainable development goals (SDGs) is explored as well as whether this goal can achieve the transition of a city to a smart one.

Keywords: Sustainable Development, Quality Education, Smart Growth; Sustainable Development Goals, Agenda 2030

INTRODUCTION

Digitalization is perhaps the outstanding trend in all the sectors of the life, all around the world and is tailored to all areas of our daily lives to achieve higher growth rates. Utilization of ICT in conjunction with the awareness of environmental problems has created an urgent need for sustainable development. Sustainable development was identified as important aspect in the Lisbon Strategy, the Europe 2020 strategy as well as in the Europe 2030 Agenda. The Lisbon Strategy as a key development strategy in the European Union was the first initiative to consider the environmental dimension of development. In general, the Lisbon Strategy was characterized by very ambitious goals, less a coherent strategic growth program and more political declaration (Kohler 2006, Rosenbaum 2010). In 2010 regardless of the success or failure of the Lisbon Strategy the European Union proposed a new development strategy the “Europe 2020: Smart, Sustainable and Inclusive Growth”, emphasizing the goal of “Smart Growth”, which is pursued through the strengthening of Education, Knowledge, and Innovation. Europe 2020 aimed to deliver smart, sustainable, and inclusive economic growth, through the implementation of digital services, investment of innovative products and the use of fast internet and functional applications, emphasizing education and knowledge policies and innovation (European Commission, 2010).

This is the first time that in European Union policy the concepts of Sustainable Development are simultaneously linked to the concepts of Education and Smart Growth.

Following the Europe 2020 strategy, at the 70th General Assembly of the United Nations, in 2015, was adopted the 2030 Agenda for Sustainable Development which it sets 17 Sustainable Development Goals (SDGs). One of these goals, SDG-4 is the

Education Goal, and it aims to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.” SDG-4, which considers the prospect of lifelong learning, and promotes the vision of education for all by 2030. Lifelong learning includes all the learning activities in long term with the aim of improving knowledge, skills, and competitiveness within personal, civic, social and employment related perspectives (United Nations, A/RES/70/1, 2015).

Both EU Strategy as well the UN, they have placed education at the heart of its strategy for promoting Sustainable Development. Through the educational process, the emergence of future leaders can be achieved. Thus, the development of leaders through education can be characterized as a journey that should be based on the Sustainable Development Goals. Therefore, higher education must be oriented and confronted with teaching, research based on pedagogical proposals with a focus on sustainable development. However, such an approach should be interdisciplinary to consider the interaction and interdependence between SDGs and, consequently, between people to develop interactive methodologies.

The formation of leaders and specialized staff through the promotion of the educational process allows the utilization of new technologies and the new digital age. In this way, education also contributes to the transition to concepts such as that of the Smart City. The concept of “Smart City” has been developed to promote the sustainable development of a city and is defined as an enhanced learning and innovative small society, based in digital tools and services of high quality for its citizens.

The goal of this study is to introduce the Education Goal for Sustainable Development and to examine the possibility of achieving the transition to the concept of Smart City

through the impact of the educational process as one of the key goals of Sustainable Development set on the 2030 Agenda.

The paper is organized as follows: First, we present the role of Education through the Europe 2020 Strategy and the Agenda 2030. Then, we present the main definitions of “smart city”, highlighting the different concepts given and showing the different fields based on each author. Then, we examine whether the goals set in the above strategies related to education can be applied to the concept of smart city. Finally, section 5 summarizes the conclusions of our work and suggests areas for further research.

THE GOAL OF EDUCATION FOR SUSTAINABLE DEVELOPMENT THROUGH THE EUROPE 2020 STRATEGY & AGENDA 2030

The Europe 2020 strategy emphasizes smart, sustainable, and inclusive growth to improve Europe's competitiveness and productivity and underpin a sustainable social market economy, as follows (European Commission, 2010):

- Smart growth: developing an economy based on knowledge and innovation.
- Sustainable growth: promoting a more resource efficient, greener, and more competitive economy.
- Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion.

To achieve the above objectives, policies have been adopted in five areas such as Employment, Research & Development, Climate change & energy, Education, Poverty, and social exclusion. The 4th objective of Europe 2020, the Education goal set two fundamentals' targets. First, the share of early school leavers (aged 18 to 24) to be reduced under 10% and at least 40% of 30 to 34 years old to have completed tertiary or equivalent education.

As we can see in the Europe 2020 strategy, great emphasis is placed on the role of education in knowledge research and innovation to achieve the smart growth that will lead by combining the other goals set, in sustainable development.

The role of Education was also emphasized in the 2030 Agenda as one of its 17 goals to achieve Sustainable Development.

At the 70th session of the United Nations General Assembly, on 25 September 2015, was adopted a global agenda with the title: “Transforming our world: The 2030 Agenda for Sustainable Development” and were set 17 Sustainable Development Goals (SDGs) and 169 targets (United Nations, A/RES/70/1, 2015)..

The goal that emphasizes Education worldwide is SDG-4 and commits countries to “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”.

SDG 4 is made up of 7 targets (and three targets which are so called ‘means of implementation’) (United Nations, A/RES/70/1, 2015):

1. Ensure universal, free, equitable, and quality primary and secondary education.
2. Ensure universal access to quality pre-primary education.

3. Ensure equal access to quality technical, vocational, and tertiary education.
4. Increase the amount of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
5. Ensure equal access to any or all levels of education particularly of marginalized groups.
6. Achieve full literacy of youths and substantially increase literacy of adults.
7. Make sure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of culture's contribution to sustainable development.

Means of implementation:

1. Build and upgrade education facilities that are child, disability and gender sensitive and supply safe, nonviolent, inclusive, and effective learning environments for all.
2. Substantially expand globally the number of scholarships available to developing countries, least developed countries, small island developing States and African countries, for enrolment in education, including education and data and technology, technical, engineering and scientific programs, in developed countries and other developing countries.
3. Substantially increase the availability of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and tiny island developing states.

Through all these targets and means of implementation, quality education will be promoted worldwide.

THE CONCEPT OF SMART CITY

The Smart City concept is a global trend of urban strategies aimed at recovering the quality of inhabitants living in urban areas and at leveraging innovation and high technologies to solve the difficult problems generated by high-population density (Dameri 2013). The concept of smart city is strongly discussed in the academic literature in recent years, to solve tangled and wicked problems inherited in the rapid urbanization. Its main objective appears to be on the role of the ICT infrastructure, although many researchers has also been carried out on the role of human capital / education, social and relational capital, and environmental interest as important drivers of urban development.

Although the concept of Smart City is increasingly used, however, it's rather an abstract concept and its definition it's current. Many definitions are given by replacing the word smart with the word digital, intelligent, virtual etc. within the academic bibliography the Smart City definitions are heterogeneous looking on which factor they consider decisive. Some researchers emphasize the role of ICT infrastructures in developing the concept of smart city, for instance Mitchell, W. J. (2013) sees "A smarter city as an organic whole--a network and a linked system". Others emphasize the role of governance that through an "smart" strategy will improve the services provided by its citizens by improving the standard of lifetime of its inhabitants and achieving sustainable development and economic process. Hall, R. E. (2000) stressed that "a city that monitors and integrates conditions of all of its critical infrastructures, can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens, will be called a smart city".

Additionally, other definitions of smart city empathize the role of human capital in urban development. Berry and Glaeser (2005) show, as an example, "that the most

rapid urban growth rates are achieved in cities where a high share of educated labour is offered by assuming that innovation is driven by entrepreneurs who innovate in industries and products which require an increasingly more skilled labor force".

However, the primary commonly accepted definition of Smart city has been given by Giffinger et al. (2007):

"a smart city may be a city well performing in six characteristics, built on the 'smart' combination of endowments and activities of self-decisive, independent and aware citizens".

This definition defines in a remarkable project conducted by the Centre of Regional Science at the Vienna University of Technology, six main ‘axes’ (dimensions) along which a ranking of 70 European middle size cities are often made. These axes are a smart economy; smart mobility; smart environment; smart people; smart living; and, finally, smart governance, who successively are analyzed into 31 major factors and 74 indicators in total. This project was the primary try to classify cities supported their level of smartness.

Based on the above definitions, we try to proceed to a taxonomy about factors which play crucial role in the definition of the concept of Smart City.

Table1. Factors of Smartness

| | Factors of Smartness | Authors |
|----|--|---|
| 1 | Information and communications technology (ICT) (a network and a linked system that develop an artificial nervous system) | Mitchell, W. J. (2006), Giffinger et al. (2007), Caragliu et al. (2009), Harrison et al. (2010), Washburn et al. (2010), Nam and Pardo (2011), Lazaroiu & Roscia (2012), Lombardi et al. (2012), Barrionuevo et al. (2012), Caragliu et al. (2012), Zygiaris (2012) |
| 2 | Physical infrastructures (roads, bridges, tunnels, rails, subways, airports, seaports, communications, water, power, even major buildings) | Hall (2000), Giffinger et al. (2007), Caragliu et al. (2009) |
| 3 | Human capital (creativity, diversity and educated labor force) | Berry & Glaeser (2005), Hollands (2008), Giffinger et al. (2007), Caragliu et al. (2009), Washburn et al. (2010), Nam and Pardo (2011), Lombardi et al. (2012), Caragliu et al. (2012), Zygiaris (2012) |
| 4 | Social capital (healthcare, public safety, real estate and utilities more intelligent) | Caragliu et al. (2009), Washburn et al. (2010), Lazaroiu & Roscia (2012), Caragliu et al. (2012) |
| 5 | Urban development (transportation systems and land use to improve the structure of a town or city) | Berry & Glaeser (2005), Barrionuevo et al. (2012), Zygiaris (2012) |
| 6 | High capacity for Learning and Innovation | Komninos (2006), Zygiaris (2012) |
| 7 | Economic and Political Efficiency | Giffinger et al. (2007), Hollands (2008), Caragliu et al. (2012) |
| 8 | Environmental protection (reduction of CO2 emission) | Caragliu et al. (2009), Lazaroiu & Roscia (2012), Lombardi et al. (2012), Caragliu et al. (2012), Zygiaris (2012) |
| 9 | Governance and Policy (administration, institutions) | Caragliu et al. (2009), Washburn et al. (2010), Nam and Pardo (2011), Caragliu et al. (2012) |
| 10 | Maximizing services to citizens (self-decisive, independent and aware citizens) | Giffinger et al. (2007), Caragliu et al. (2009) |
| 11 | Industry (innovate products, entrepreneurship and more skilled labor force) | Berry & Glaeser (2005), Nijkamp et al. 2011 |

The European Parliament (2014) synthesizes international debate and introduces a formal definition that, while providing a milestone in the search of definitions, could also shape the debate and the smart city evolution: 'a smart city consists of not only components but also people. Securing the participation of citizens and relevant stakeholders in the smart city is therefore another success factor'. This definition tends to coincide with the previous system of systems, but explicitly introduces people component, just implicitly included in the system concept (Russo, F., Rindone, C., & Panuccio, P., 2016).

FROM THE GOAL OF EDUCATION FOR SUSTAINABLE DEVELOPMENT & THE SMART CITY CONCEPT

From our research we can say that education is at the top of the goals pursued by both the European Union and the United Nations policies to achieve the goals of sustainable development, which are related to the main pillars that make up the concept of Smart City.

With the adoption of the Europe 2020 strategy, the first results have begun to appear. The percentage of early school leavers (aged 18 to 24) has been reducing continuously in the EU since 2002, for both men and women, from 17.0 percent in 2002 to 10.6 percent in 2017, which is a steady progress towards the Europe 2020 target of 10 percent, (United Nations Report, 2018).

The situation seems to be similar in the target to increasing attainment at tertiary level for 30- to 34-year-olds, given the fact that the percentage of people who have attained tertiary education in the EU-28 reached 39.9 percent in 2017, which is a large increase compared to 23.6 percent which was the percentage in 2002 (United Nations Report, 2018).

"Education and training play an important role in improving employability," according to the Europe 2020 report, The employment rate of recent graduates (20- to 34-year-olds having left education and training in the past one to three years) has dropped considerably from 82.1 percent in 2008 to 75.4 percent in 2013. This fact can also be justified by the economic and financial crisis. However, it has clearly increased since 2013, reaching 80.2 percent in 2017" (United Nations Report, 2018).

Additional, education as an important factor in achieving sustainable development is mentioned in 5 other goals of the 2030 Agenda:

- SDG-3: Health and well-being (target 3.7)
By 2030, ensure universal access to sexual and reproductive healthcare services, including for family planning, information and education, and the integration of reproductive health into national strategies and programs.
- SDG-5 Gender equality (target 5.6)
Number of countries with laws and regulations that guarantee women aged 15-49 years access to sexual and reproductive health care, information and education.
- SDG-8 Decent work and sustainable growth (target 8.6)
By 2020 substantially reduce the proportion of youth not in employment, education or training.
- SDG-12 Responsible consumption & production (target 12.8)
By 2030 ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.
- SDG-13 Climate change mitigation (target 13.3)

Improve education, awareness raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning.

In the international literature there are several researchers who link the goal of education as a means of achieving the other goals set in the 2030 agenda. For example, Kolb et al. (2017) considers that SDG-4 has direct impacts on the others: sustained, inclusive, and sustainable economic growth, full employment and productive and decent work for all (8); responsible consumption and production (12); partnerships and means of implementation (17); and mainly on building resilient infrastructures, promoting inclusive industrialization and sustainable development, and fostering

innovation (9), by promoting innovation at a greater intensity.



Fig1. Impact of business schools on the Sustainable Development Goals. Source: Kolb et al. (2017).

In summary we can say that quality education is the foundation of sustainable development because it:

- facilitates the lifting of people out of poverty and prevents the perpetuation of poverty from generation to generation
- empowers marginalized groups
- enables the realization of other human rights
- reduces social, economic, and power inequality
- drives sustainable and inclusive economic growth
- facilitates peace, tolerance, and respect for human rights

Equally, the right to education cannot be fully realized without sustainable development because poverty - as well as being unjust, unnecessary, and a human rights violation - is one of the biggest barriers to access to education (Agenda 2030, 2015).

As shown by the previous analysis, the goal of education through policies that promote sustainable development is in itself very important, but it also has an impact and is interrelated with the other goals set in the 2030 agenda.

In addition, as we can be seen from the table in the previous section, which presents all the factors that define the concept of smart city in the international literacy, there are many researchers who place great emphasis on human capital, education, knowledge and skills, innovation, and lifelong learning.

Finally, it is worth mentioning that all the factors that define the concept of smart city are key factors in the three pillars of sustainable development (Economic, social, and environmental aspect).

Thus, it appears that the concepts of education, of sustainable development and smart city are interconnected concepts and complement each other with the ultimate goal of achieving the prosperity of a city.

CONCLUSIONS

In the last two decades, there has been given a strong emphasis on Smart growth, which was mainly achieved through the transition of cities to the digital era. The European Union (EU), in order to achieve economic growth, sustainable development and its dominance on the global market, had prepared a comprehensive development program, which initially was the Strategy Europe 2020 and now is the Agenda 2030.

The Smart City is an example of the “Smart Growth” goal of the Europe 2020 strategy and is strongly discussed in the academic literature in recent years, to solve tangled and wicked problems inherited in the rapid urbanization. The Smart City concept ensures sustainable environment and the key elements which identify them are in line with the principles of sustainable development and because their main purpose is the

improvement of the quality of life of residents without restricting this possibility to future generations.

In this paper we examine the role that Education plays in achieving sustainable development goals (SDGs) which was highlighted in all the strategies at European level and at the level of the United Nations, as well as whether this goal can achieve the transition of a city to a smart one.

Based on our bibliographic research we concluded that Education has a positive contribution to achieving the sustainable development goals. Education for Sustainable Development is a lifelong learning process and an integral part of quality education. It enhances the cognitive, social, and emotional and behavioral dimensions of learning. It is holistic and transformational, and encompasses learning content and outcomes, pedagogy, and the learning environment itself. The first part of this paper reviews the connection between Education and the Sustainable Development through the Europe 2020 Strategy and the Agenda 2030. Then we present the main definitions of “smart city”, highlighting the different concepts given and showing the different fields based on each author. Finally, we examined whether education, in addition to the great determinant role which plays in achieving the goals of sustainable development, can also play an important role in defining the concept of the smart city.

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