The Future of Cities is Smart, Inclusive and Sustainable: Research and Proposal of Smart City Layer Implementation for Mexico

El Futuro de las Ciudades es Inteligente, Inclusivo y Sostenible: Investigación y Propuesta de Implementación para México

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Technological innovation: It is a proposal of better use of spaces and resources management combating problems that now are affecting many people in the world with innovation in smart technology.

Industrial Area of application: Smart cities: robotics, artificial intelligence, renewable energy, nanotechnology, building, aerospace, big data, IoT and biology.

Resumen

Pienso que no podemos ser egoístas cuando vivimos en un mundo maravilloso. Hoy en día tenemos que ser sustentables con el planeta. Vivir nuestra vida en total balance: producción y recursos. Como personas es importante ser incluyentes y vivir en armonía con la naturaleza, tecnología, energía limpia y en equidad de género. Como ciudadanos debemos expresar a los líderes de nuestro país que exigimos leyes y políticas inclusivas y eco-sostenibles. Eso no sólo beneficiará nuestra calidad de vida, sino que también será un signo de respeto a nuestro planeta, trabajando en tareas para hacerlas más fáciles todos los días. Por otro lado, innovar implica un mejor uso del espacio y de los recursos, mejorando la planificación y distribución de alimentos, combatiendo la pobreza y el hambre que afecta a muchas personas en el mundo.

Si construimos "ciudades inteligentes" hoy, seremos "personas inteligentes", debido al hecho de que somos conscientes de nuestro futuro. Al hacer un uso adecuado de los recursos como: el agua, la electricidad, el gas, el petróleo y la gasolina, se puede generar un ahorro ya que no se desperdiciarán. Por lo tanto, la economía también se verá impulsada por mejores prácticas de

producción, reduciendo el desperdicio y los entornos de trabajo serán más agradables. Juntos podemos hacer que las cosas funcionen mejor, juntos somos más fuertes y más fuertes somos unidad, un planeta que se beneficiado por la "Industria 4.0"; en equidad y sostenibilidad. Si queremos estar mejor, tenemos que trabajar mejor en un mundo común, con objetivos comunes. Somos capaces de producir tecnologías ecológicas tan creativas y funcionales como las tradicionales. Tenemos talento, hay que darnos la oportunidad de creer en nosotros mismos.

Palabras Clave: Objetivos Mundiales de Desarrollo Sustentable, Industia-4.0, IoT, Ciudades Inteligentes, Energías Renovables.

Abstract

Thinking that we cannot be selfish when we live in a wonderful world. Nowadays, we have to be sustainable with the planet. Live our life in total balance: production and resources. As people is important to be inclusive and live in harmony between nature, technology, clean energies and gender equality. As citizens we must express to our country's leaders that we require laws and inclusive and eco-sustainable policies, that will not only benefit our life quality, but also be a sign of respect to our planet, working on tasks to make them easier every day. On the other hand, innovation involves a better use of spaces and resources to improve planning and distribution of food, combating poverty and hunger that affect many people in the world. If we build Smart Cities today, we will be acting as smart people because we are conscious of our future. People save money when they do a correct use of resources like water, electricity, gas, oil and petrol because it is not becoming waste. Therefore, the economy will be boost by improving production practices, reducing waste and having more enjoyable working environments. Together we make things work better, together we are stronger and stronger and a unit; a planet benefited from the "Industry 4.0" in equality and sustainability. If we want to be better, we have to work better in a common world, common goal. We are able to produce Eco technologies as appealing and functional as the traditional. We have talent; we just have to give us the chance to believe in ourselves.

Key Words: Global-Goals, Industry-4.0, IoT, Smart-Cities, Renewable energy.

1. Introduction

Since the industrial revolution, people have sought better opportunities for education, employment, health and basic services like electricity and potable water. Today, the situation has not changed much; people continue leaving the fields to go to the city to survive.

The trend of civil construction is scalable, it grows and ends with the free space, and is built up; taller towers and second-floors bridges. It is forbidden to waste any green space. Ironically, we are creating artificial spaces in the natural environments that we extinguish for our luxury ambition and the growing population.

On the other hand, inequality is present in distribution of valuables. There are those suffering from shortages of water and electricity, and those who have pools and the privilege of wasting resources. Communications do not reach the entire population equally, because not everyone can afford the price of gasoline and maintenance of a new car, have internet access in their mobile phones or even pay the device itself, that have become part of the academic professional, social and cultural development. The public transportation is not enough for the huge number of users who need it, excluding their poor conditions.

2. Emerging urban mobility

We waste our life in the moves, "on average, a person who moves by public transport takes 2 hours and 8 minutes" to get to work. In turn, it develops obesity problems, stress, and exposure to pollutants, spending a lot on journeys and losing productivity.

Society has brought new technology features and designed alternatives such as car-sharing services between neighbors, taxis and bicycle traveling.

Thus, all of these collective mobility ideas, technology is the perfect way to create smarter cities with automatic systems for the use of resources such as light and water, used not because of motion sensors.

3. Buildings to the height of challenges

Implementing walls and green roofs, not only for esthetics but for life quality and as an option to get food.[1] Take advantage of every drop of water from heavy rainy season,

preventing flooding and prosecuting the vital liquid to their treatment and recovery. In states with high temperatures, make common use of solar cells and wind capture. Building eco-sustainable materials, with the support of local scientists to prove their talent and skills for development that exists and evolves in order to offer biodegradable materials.

4. Telecommunications, energy and health for all

It is necessary to expand the network coverage of internet, to increase telecommunications efficiently, break communication barriers and reduce both health and economic costs. Improve roads and provide adequate public transport services for residents, seeking a culture of vial respect.

We cannot be selfish since we live in a wonderful world. Nowadays we have to be sustainable with the planet. Live our life in total balance: production and resources. As people is important to be inclusive and live in harmony between nature, technology, clean energies and gender equality.

As citizens we must express to our country's leaders that we require laws and inclusive and eco-sustainable policies. That will not only benefit our life quality, but also that be a sign of respect to our planet, working on tasks to make them easier every day.

Additionally, we could have better tools in hospitals like "Da Vinci Robot"[2]. We could dedicate more time to scientific research to cure chronic ills and create new medical treatments. In this way, our health will progress without harmful contaminants on

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[1] Cavallo R., Komossa S., Marzot N. (2014). New Urban Configurations. Netherlands: IOS Press.

[2] Coronel, Maribel R. (2016). Una historia de cirugía robótica. 13 de noviembre de 2016, de El Economista website: https://www.eleconomista.com.mx/opinion/Una-historia-de-cirugia-robotica-20161113-0005.html

air, water and ground. People can recycle most of their waste, despite of being impossible not to generate waste and think "smart" when they buy new things asking their-selves if it something needed or just a desire.

On the other hand, innovating in a better use of space and resource management will improve planning, distribution of food and will combat poverty and hunger that affect many people in the world.

5. Proposal for smart cities

Talking about housing, it is not about building equal spaces for all, but adapting the property works for each type of environment: either rural or city, under the same principle of sustainability and technological vanguard. If we build Smart Cities today, we will act as smart people, as we are conscious of our future.

There are many ways to save money if we use energies in a proper way. The water, electricity, gas, oil and petrol will not become waste. It is not just an automation of all tools, instead, everything must be interconnected and we have to be able to control them anytime, from anywhere and easily. Any screen or pane of glass may be the mean to be in the middle of the situation, making full use of telecommunications to bring easier, agile and light life that allows us to live our dreams and pleasures; giving us time for our families, couples and friends.

We are in times where it is not enough to reduce, recycle and reuse; resources must be implemented, protected and used. So, the economy will be boost by improving production practices, reducing wasting and having more enjoyable working

environments. [3] Investing "smart" will generate a chain of actions that involve more strategic and dynamic enhancements across all sectors: government, society, communications, transports, buildings, clean energy, quality of life and a more favorable environment.[4]

There are many undertaking green products, which we could consider that reduce the ecological footprint; also with the initiatives of civil society it is possible to educate and raise awareness on best environmental practices, we could implement a legal framework that allows us to "live smart".

6. Talent and youth for the inclusion

In addition, the talent in schools for the development of technology is at the forefront of any country of "first world", we just to need to support, implement and leverage intelligently what young people create.

To fulfill these proposals, it is crucial to be inclusive among humans, deleting social classes, age, sex, nationality, religion, sexual preferences and other reasons for discrimination and exclusion.

To have peace, gender equality is paramount. Man and woman are as capable as important, opportunities and voice must be equal. Together we make things work better, together we are stronger and a unit, a planet benefited from the "Industry 4.0" in equity and sustainability. "Industry 4.0": "This term originates from a strategic initiative of the German Government's. New High-Tech

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[3] Marc Simon, Joan. (2016). 31 July 2016. 31. July 2016, de Let's Do It world Org website: https://www.letsdoitworld.org/2016/07/recycling-cool-not-enough/
[4] Frost, Sullivan. (2017). Investing "smart" will generate a chain of actions that involve more strategic. February 2017, de Frost and Sullivan website: https://www.principalglobal.com/documentdownload/80760

Strategy (Industry 4.0). The term refers to an anticipated Fourth Industrial Revolution where cyber-physical systems, cloud computing, big data, artificial intelligence, machine learning and the internet-of-things will more effectively connect and integrate Manufacturing systems".[5]

7. Chores for the goal

As human beings, we have managed to make big changes and contributions to future generations, it has demanded us effort, dedication and sacrifices. We have also damaged the environment, at the expense of progress. But that time has not passed in vain, today after hundreds of years, we have evolved as a species, and fortunately, today we are more aware of the consequences of our actions. No desire to repair the past, we must move forward and be better in a more equitable present. This awakening leads us better roads, ways in which the "Industry 4.0" is part of it[6]. Social networks, the Internet, telecommunications, mobile devices (cell phones, electronic tablets and cameras) are increasingly necessary to accomplish our daily activities.

To satisfy them intelligently and friendly with the environment, we can take programming and automation more efficiently, fueling the industry with renewable energy, making the most of "IoT" (Internet of Things), taking artificial intelligence to unexplored sectors, being disruptive to applications of nanotechnology

and aerospace research, for mobility and connectivity of our lives today.

"The internet-of-things (IoT) refers to networks of physical objects (devices, vehicles, buildings, equipment, etc.) containing electronic hardware, software, and sensors to enable them to be connected to the internet. This allows objects to collect and exchange data".[7]

On the other hand, being immersed in a wealth of information enriches data but also overwhelms us, so the "big data" should be carefully treated and analyzed to provide sustenance information in order to facilitate decision-making, using the information power wisely and to reach the established goals.

With a detailed and patient observation of our environment, we favor the development of biotechnologies, which learn and imitate the Nature, where there are many of the solutions to problems, as diseases, that we have caused.

8. Harmony with global goals for sustainable development

Among the "Global Goals", [8] (Fig. 1.) the number 9 is INDUSTRY, INNOVATION AND INFRASTRUCTURE and it talks about build resilient infrastructure, inclusive and sustainable industrialization and foster promote innovation. "Goal 9 encompasses three important aspects of sustainable development: infrastructure, industrialization

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[5] López-Gómez Carlos, Leal-Ayala David, Palladino Michele, O'Sullivan Eoin (2013). EMERGING TRENDS IN GLOBAL ADVANCED MANUFACTURING: CHALLENGES, OPPORTUNITIES AND POLICY RESPONSES. UK: University of Cambridge's Institute for Manufacturing and United Nations Industrial Development Organization (UNIDO).

[6] Professor Henning Kagermann, Professor Wolfgang Wahlster (2016). INDUSTRIE 4.0 Smart Manufacturing for the Future. 2016, de Germany Trade and Invest website: http://www.gtai.de/GTAI/Content/EN/Invest/_SharedDocs/Downloads/GTAI/Brochures/Industries/industrie4.0-smart-manufacturing-for-the-future-en.pdf

[7] López-Gómez Carlos, Leal-Ayala David, Palladino Michele, O'Sullivan Eoin. (2013). EMERGING TRENDS IN GLOBAL ADVANCED MANUFACTURING: CHALLENGES, OPPORTUNITIES AND POLICY RESPONSES. UK: University of Cambridge's Institute for Manufacturing and United Nations Industrial Development Organization (UNIDO).

[8] United Nations Conference on Housing and *Sustainable Urban Development, Habitat III* (2016). THE NEW URBAN AGENDA EXPLAINER. 2016, de habitat3.org Sitio web: https://www.habitat3.org/file/537430/view/591365

and innovation. Infrastructure provides the basic physical systems and structures essential to the operation of a society or enterprise. Industrialization drives economic growth, creates job opportunities and thereby reduces income poverty. Innovation advances the technological capabilities of industrial sectors and prompts the development of new skills".[9] Moreover, the number 9 is SUSTAINABLE CITIES AND COMMUNITIES: Make cities and human settlements inclusive, safe, resilient and sustainable. "More than half the world's population lives in cities. By 2030, it is projected that 6 out of 10 people will be urban dwellers. Despite numerous planning challenges, well-managed cities and other human settlements can be incubators for innovation and ingenuity and key drivers of sustainable development".[10] And on the other hand, is important to have on mind the goal number 5 is GENDER EQUITY, which refers to achieve gender equality and empower all women and girls. "Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women; eliminate all forms of violence against all women and girls in the public and private spheres…; ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life".[11] Among many others issues.

Figure 1. Smart cities and global goals for sustainable development.

The "Industry 4.0" by itself does not act. As we are who create it, it is our responsibility to share it with the world population, creating media for its distribution and total benefit. It is not only engineering work, it is social work to be inclusive and create environments that allow access to technologies, development and progress.

9. Conclusions: expectations to live with "intelligence"

It is necessary to have support in education areas and youth to learn how to use technologies so we can continue to cultivate the intellect to make them perfect. Economies will flow in income with the better use of resources and their equal distribution. The jobs that are to be created will favor the professional and personal development of employees when having the tools that increase productivity, reduce risks and be liked by employees.

Allowing access to decent housing and nutritious food quality, will be the key for the development of "Smart Cities"(Fig. 2.). The governance legislation must be adapted to future times and as citizens we must join these purposes, coupled with a gender

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[9] The United Nations. (2015). SUSTAINABLE DEVELOPMENT GOAL 9. 2017, de Sustainable Development Goals website: https://sustainabledevelopment.un.org/sdg9

[10] The United Nations (2015). SUSTAINABLE DEVELOPMENT GOAL 11. 2017, de Sustainable Development Goals website: https://sustainabledevelopment.un.org/sdg11

[11] The United Nations (2015). SUSTAINABLE DEVELOPMENT GOAL 5. 2017, de Sustainable Development Goals website: https://sustainabledevelopment.un.org/sdg5

equality system that is inclusive in decision-making.

Figure 2. Live in "smart cities".

If we want to be better, we have to work better for a common world, common goals. We are able to produce Eco technologies as appealing and functional as the traditional. We are talented; we just have to give us chance to believe in ourselves.

To live in "smart cities, planned by intelligent people in better environments is possible; men and women who now anticipate solutions for the challenges of future".

10. Gratitude

11. References

1) Cavallo R., Komossa S., Marzot N. (2014). New Urban Configurations. Netherlands: IOS Press, Pág. 847.

2) Coronel, Maribel R. (2016). Una historia de cirugía robótica. 13 de noviembre de 2016, de El Economista. Website: https://www.eleconomista.com.mx/opinion/Una-historia-de-cirugia-robotica-20161113-0005.html.

3) Marc Simon, Joan. (2016). 31 July 2016. 31. July 2016, de Let's Do It world Org. Website: https://www.letsdoitworld.org/2016/07/recycling-cool-not-enough/.

4) Frost, Sullivan. (2017). Investing "smart" will generate a chain of actions that involve more strategic. February 2017, de Frost and Sullivan. Website: https://www.principalglobal.com/documentdownload/80760.

5) López-Gómez Carlos, Leal-Ayala David, Palladino Michele, O'Sullivan Eoin (2013). EMERGING TRENDS IN GLOBAL ADVANCED MANUFACTURING: CHALLENGES, OPPORTUNITIES AND POLICY RESPONSES. UK: University of Cambridge's Institute for Manufacturing and United Nations Industrial Development Organization (UNIDO) Page 27.

6) Professor Henning Kagermann, Professor Wolfgang Wahlster (2016). INDUSTRIE 4.0 Smart Manufacturing for the Future. 2016, de Germany Trade and Invest. Website: http://www.gtai.de/GTAI/Content/EN/Invest/_SharedDocs/Downloads/GTAI/Brochures/Industries/industrie4.0-smart-manufacturing-for-the-future-en.pdf.

7) López-Gómez Carlos, Leal-Ayala David, Palladino Michele, O'Sullivan Eoin. (2013). EMERGING TRENDS IN GLOBAL ADVANCED MANUFACTURING: CHALLENGES, OPPORTUNITIES AND POLICY RESPONSES. UK: University of Cambridge's Institute for Manufacturing and United Nations Industrial Development Organization (UNIDO). Page 29.

8) United Nations Conference on Housing and *Sustainable Urban Development, Habitat III.* (2016). THE NEW URBAN AGENDA EXPLAINER. 2016, de habitat3.org Sitio web: https://www.habitat3.org/file/537430/view/591365.

9) The United Nations. (2015). SUSTAINABLE DEVELOPMENT GOAL 9. 2017, de Sustainable Development Goals. Website: https://sustainabledevelopment.un.org/sdg9.

10) The United Nations. (2015). SUSTAINABLE DEVELOPMENT GOAL 11. 2017, de Sustainable Development Goals. Website: https://sustainabledevelopment.un.org/sdg11.

11) The United Nations. (2015). SUSTAINABLE DEVELOPMENT GOAL 5. 2017, de Sustainable Development Goals Website: https://sustainabledevelopment.un.org/sdg5.