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A 15 C's Pathway of Sustainability in Environmental Health Management & The Crucial Role of Higher Education Institutions

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Abstract

Manmade environmental degradation has created an unsustainable status quo posing many known and yet unknown environmental health threats. Innovation, which may be considered as a function of time, location, and explicit and tacit knowledge acquisition, is essential for the effective and sustainable management of environmental health issues. The following series of C's may function as a pathway towards sustainability in environmental health management: (1) Consciousness of the urgency, (2) Comprehension of the complexity, (3) Confidence in our ability to change, (4) Capacity-building for decision-making, (5) Cooperation among stakeholders, (6) Carbon footprint reduction, (7) Circular economy adoption, (8) Corporate sustainability, (9) Creativity (Creative thinking and action), (10) Creation of resilient and adaptive communities, (11) Creation of sustainable living environments for all social groups, (12) Creation of new explicit and tacit knowledge, (13) Communication of the new knowledge, (14) Curriculum updates, and (15) Crisis management. Apart from the emerging teaching and research priorities, the proposed pathway requires a strategic higher education institutions' contribution to the necessary societal transformation towards sustainability. Higher education institutions could play a crucial role in all the described steps of this 15 C's pathway and in the interconnections between them. Each step may offer emerging opportunities for innovative planning and action towards a more sustainable future. However, further research and pilot applications are necessary for the evaluation of the proposed theoretical model.

Keywords: Education, Environmental health, Innovation, Sustainability, Tacit knowledge

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1. Introduction

From the time of ancient cisterns and aqueducts and of the first suburban dump constructed outside ancient Athens, up until the potential future use of plastic-eating microorganisms, humanity is constantly striving to meet environmental health (EH) innovation milestones (Mays, 2014; Yang et al., 2015; Avgerinou et al., 2016; Koren, 2017). Despite this constant innovation in the EH sector, innovation differs vastly from one geographical area to another; this difference is especially visible between the developed and developing world (van Nieuwenhuijzen et al., 2009; Luzi et al., 2016; Zanello et al., 2016; Lausselet et al., 2017). The capacity for innovation differs not only among countries, but also among various institutions, between the public and private sector, and between firms of different sizes within a certain country (Nieto & Santamaría, 2010; Wang & Wang, 2012; Bloch & Bugge, 2013). It is obvious that innovation - which is essential for the effective and sustainable management of EH issues (Metz et al., 2016; Karjalainen et al., 2017; Demir et al., 2019) - can be considered as a function of time, location, and explicit and tacit knowledge acquisition.

Environmental degradation has created an unsustainable status quo that poses several known and unknown threats to EH (Costello et al., 2009; Smith et al., 2014; Kim & Zoh, 2016; Carratt et al., 2017; IPCC, 2019; Makris, 2019). Humans' relationships with their natural and man-made environments are multi-dimensional and are governed by socio-economic, cultural, health, ethical, and religious aspects (Schulz & Northridge, 2004; Costello et al., 2009; Morrison et al., 2015; Udofia et al., 2015; Fatorić et al., 2017; Weir et al., 2017; Tol, 2018; IPCC, 2019). All stakeholders have to act urgently and cooperate closely to deal with these threats, such as changing weather and landscape patterns, impacts on agriculture and the economy, food - and water-insecurity issues, increasing healthcare costs, and negative impacts on cultural heritage - such as archaeological sites (Costello et al., 2009; Daly, 2014; Zahid et al., 2015; Rojas-Downing et al., 2017; Tol, 2018; IPCC, 2019; Makris, 2019). A joint, innovative, interdisciplinary, and interprofessional effort among higher education institutions (HEIs), authorities, energy providers, the entire private and public sector, and local people is urgently required to mitigate and reverse the increasing deterioration of EH (Mapira & Mazambara, 2013; Eta & Angba, 2017; Howarth & Monasterolo, 2017; Mason et al., 2017; Milman et al., 2017; Klein et al., 2018; Tang & Demeritt, 2018; Elsner et al., 2019; IPCC, 2019; Makate et al., 2019; Makris, 2019). Given the nature of environmental problems, humanity must also adopt intergenerational cooperation (between current and future generations) to ensure sustainability.

Important factors affecting EH are legislation, the proper management of scientific uncertainty, and the management and transfer of relevant explicit and tacit knowledge (Cavusgil et al., 2003; Sen, 2005; Huang & Shih, 2009; Lwoga, 2010; Hens & Stoyanov, 2014; Iacobuta et al.,

2018; Makondo & Thomas, 2018; Reis & Spencer, 2019). Moreover, the tacit and traditional knowledge of local indigenous communities, combined with scientific and technological advances, could generate innovations capable of speeding up sustainability (Tripathi & Bhattarya, 2004; Hunter, 2005; Nyong et al., 2007; Santha, 2010; Chhetri et al., 2012; Makondo & Thomas, 2018; Oroma & Guma, 2018; Makate et al., 2019).

The aim of this paper is to propose a pathway of sustainability in EH management, and to highlight the significant role HEIs could play in this process. The key aspects of EH will also be briefly covered.

2. A 15 C's Pathway of Sustainability in EH Management

EH is defined as the facet of public health concerned with the natural and man-made environmental factors that have the potential to impact health (McSwane et al., 2015; Frumkin, 2016). Several different professionals are involved in EH, including doctors, physicists, social and political scientists, civil engineers, architects, psychologists, zoologists, and food and noise inspectors (Fitzpatrick, 2002). One of the most common examples of an EH issue is climate change (CC). CC affects human health both directly (though extreme weather events) and indirectly (for example, through airborne and vector-borne diseases). It is considered to be the most significant global health threat of this century (Costello et al., 2009; Smith et al., 2014; IPCC, 2019).

Environmental crises are unavoidable and require appropriate management (Wisner & Adams, 2003; Moser & Luers, 2008; de Bruijn et al., 2017; IPCC, 2019). Moreover, vulnerable groups, including low-income families, people with medical conditions, and homeless people must be protected immediately (Costello et al., 2009; Akerlof et al., 2015).

The following series of "C's" could be a pathway towards sustainability in EH management:

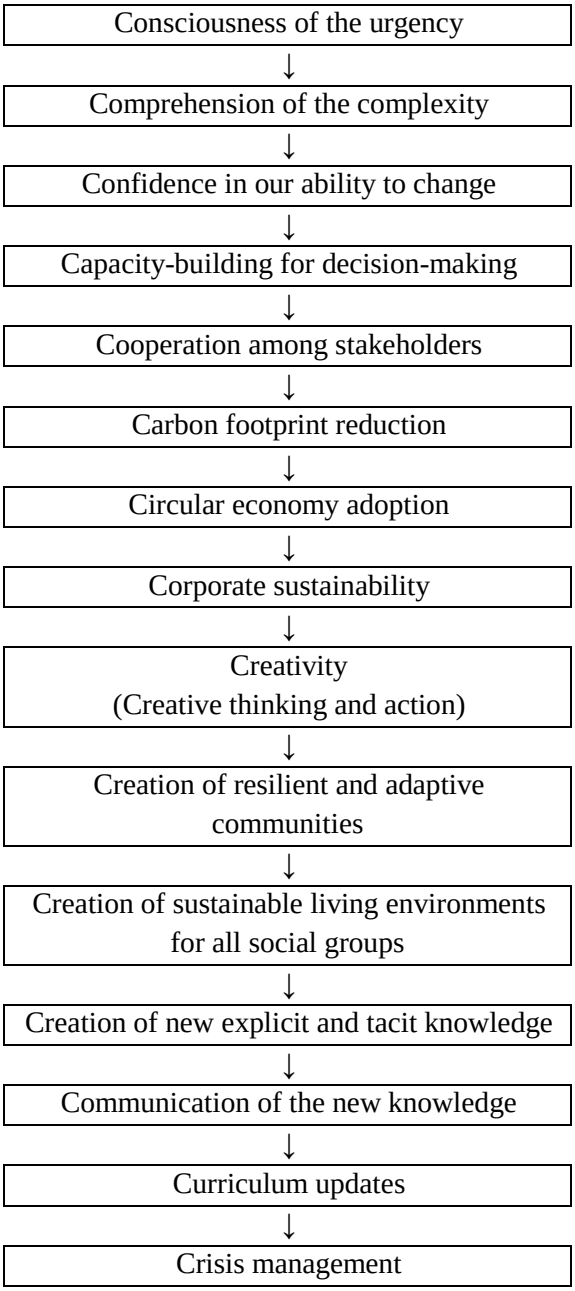

Figure 1: 15C's Pathway in EH Management

HEIs and firms are among the most important agents in this pathway. Both can promote innovation by investing in human capital and research, and by adopting sustainable strategies (Cortese, 2003; Benn et al., 2006; Smith et al., 2011; Amini & Bienstock, 2014; Perić & Delić, 2016; Boiral & Heras-Saizarbitoria, 2017; Skanavis et al., 2017; Geissdoerfer et al., 2018; Michalena, 2018; Olopade et al., 2020). Research could serve as an innovative driver of sustainability, including the proposal of newer methods and technologies that emit fewer greenhouse gases or reduce packaging waste (Benn et al., 2006; Fernández Fernández et al., 2018; Clark et al., 2019). Research is also necessary to understand the complexity of EH issues, eliminate environmental injustice, and reduce scientific uncertainty (Kundzewicz et al., 2018; Schreckenberg, 2018).

3. The crucial role of HEIs

Each educational institution is a complex system, which comprises students and teaching staff, buildings and indoor environments, and various services. Further, educational institutions have their own carbon footprint, and should lead by example by reducing it (Alajmi et al., 2012; Lambrechts &Van Liedekerke, 2014; Berchin et al., 2018). These institutions must promote research and prepare students to become responsible citizens and future decision-makers (Cortese, 2003; Mitchell & Weiler, 2011; Maxwell & Blashki, 2016; Perić & Delić, 2016; Eta & Angba, 2017; Skanavis et al., 2017; Berchin et al., 2018). Therefore, it is imperative that they invest in relevant research, disseminate knowledge, establish lifelong learning networks, and participate in the shaping of proper mitigation strategies against CC and other EH threats (Mohd Ghazali et al., 2007; Ardalan et al., 2013; Azeiteiro et al., 2015; Skanavis et al., 2017). HEIs must become important agents of the change, working towards sustainability (Cortese, 2003; Ćulum et al., 2013; Foo, 2013; Zamora-Polo & Sánchez-Mertín, 2019). Their proper interaction and cooperation with all stakeholders—such as the government, firms, non-governmental organizations, and local communities—is crucial (Henstra, 2017; Galvao et al., 2009; Pundt & Heilmann, 2020).

Education for sustainable development must cover factors associated with EH by introducing new courses, constantly updating existing ones, and by organizing relevant lifelong learning programs (Khalaf-Kairouz, 2012; Azeiteiro et al., 2015; Obasi & Ogwuche, 2016; Ahonen & Lacey, 2017; Lasker et al., 2019). The curricula of the many disciplines related to EH, such as agriculture, economics, social sciences, psychology, law, and management sciences (see Fitzpatrick, 2002), must constantly evolve not only to cover the market needs (Tavoletti, 2010), but also to ensure sustainability (Khalaf-Kairouz, 2012).

Education for sustainable development must also include indigenous knowledge transmission (Kaya & Seleti, 2013; Ford et al., 2014). This important type of knowledge must be recorded, stored in databases, properly incorporated into curricula, and disseminated adequately (Hunter, 2005; Sen, 2005; Mapira & Mazambara, 2013; Ford et al., 2014; Makondo & Thomas, 2018; Oroma & Guma, 2018). Further, formal strategies against environmental degradation should integrate indigenous knowledge in favor of sustainability, such as in the case of CC (Nyong et al., 2007). HEIs should act as depositaries and guardians of indigenous and traditional knowledge and skills.

4. Conclusion

Todays' economies are unfortunately expanding in an unsustainable manner, increasing the burden on the environment. However, humanity now has the knowledge, skills, and technology to turn the current unsustainable status quo into a reality where current and future generations can thrive. Given the fact that higher education's traditional missions of teaching and research are not enough for achieving sustainability, educational institutions must adopt a more strategic role that transforms them into socially responsible "gates" to a sustainable future. Regarding EH, a joint, innovative, and effective effort among HEIs, authorities, the private and public sector, and local people is urgently required to mitigate and reverse the constant deterioration of EH.

This paper suggests a theoretical framework towards sustainability in the EH-management field. HEIs could play a crucial role in all the described steps and in the interconnections between them. Further research and pilot applications are necessary for the evaluation of the proposed theoretical model.

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