Article

Making Hospitals Sustainable: Towards Greener, Fairer and More Prosperous Services

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Abstract: The growing demand for hospital services and the pressure to incorporate sustainable strategies into hospital management have led hospitals to rethink their business model and seek new ways to manage their operations. Corporate sustainability is an important way to make hospitals more sustainable and competitive. Therefore, this paper proposes a framework that contains the drivers for the management of sustainability in hospitals (SH), developed through the content analysis method. As a result, this study proposes five drivers: toward the circular economy; making sustainable buildings; adopting knowledge management and organizational culture; employing management systems, tools, and methods; and applying technological innovations. This framework contributes in a managerial way to helping managers of hospitals in managing sustainability; making their businesses fairer, greener, and more prosperous; and fulfilling their commitments to the well-being of their employees and society, providing a basis for moving toward the premises of the United Nation's 2030 Agenda. This study also scientifically contributes to the academic maturation of the topic by systematizing elements and adding insights to the state of the art on SH. It is recommended that future studies add new elements to the drivers or even propose new drivers for the continuous scientific advancement of this topic.

Keywords: sustainability in hospitals; sustainable services; sustainable development; hospital management

1. Introduction

Intense population growth has contributed to the increase in the consumption of goods and services, which, added to inefficient public policies, are negatively transforming the living conditions on the planet, causing impacts on the environmental, economic, and social spheres and on the balance between them [1]. The high demand implies an increase in production activity, which increases the emission of greenhouse gases and culminates in the warming of the planet, causing severe environmental consequences. This warming generates climate changes that threaten to reverse the advancements in health achieved by society. Heatwaves are increasing in intensity and number, aggravating chronic diseases, and leading to the deaths of thousands of people. Storms, floods, tornadoes, and droughts are occurring with increasing intensity, compromising water supplies in many parts of the world, triggering mass migrations and public health crises [2]. If commitments are not made by governments and organizations and effective actions against global warming are not taken, these effects will become irreversible [3]. Regarding the economic sphere, the intense production of goods and services to meet the growing demands of consumption has generated an exponential and unsustainable increase in the exploitation of resources, which is leading to their scarcity and/or depletion, causing economic stagnation and crisis in many countries [4]. Consequently, the social sphere is also directly affected by these issues, since they imply an increase in inequality and the difficulty of access to education, security, housing, health, and basic sanitation [5].

Due to this scenario, organizations are being pressured by society, governments, environmental agencies, competitors, customers, and even their own employees to incorporate sustainable strategies into the management of their companies [6]. Sustainability has become an important part of business success because it helps businesses improve their operational, environmental, and social performance and, thus, their competitiveness. Therefore, sustainability makes it possible to balance organizational objectives with the preservation of human beings and the planet [7].

In 2015 the United Nations proposed the 2030 Agenda, which is a document that guides nations toward sustainable development and presents a shared plan for peace and prosperity for people and the planet. This agenda is based on the premise that ending poverty and other deprivations must be addressed in strategies that improve health and education, reduce inequality, and stimulate economic growth while combating climate change [8]. It sets out 17 Sustainable Development Goals (SDGs), which are an urgent call and commitment to action from member countries in a global partnership to establish and fulfill strategies, processes, and practices to achieve and enhance sustainable development [9]. According to the Brundtland Report, sustainable development is a set of actions that meets the needs of current generations without putting the ability to meet those needs of future generations at risk [10].

In the business context, sustainable development starts with corporate sustainability (CS), which is applied to the business field through management and organizational processes [11]. CS is an operationalized approach based on the triple bottom line (TBL); that is, it considers the three dimensions of sustainability (environmental, economic, and social) [12]. It has emerged as an alternative to traditional short-term, for-profit approaches. In this sense, organizations must develop their operational thinking while also thinking about the environmental and social dimensions that will contribute to their longevity and the well-being of human beings and the planet [13].

The movement towards sustainability has also been intense in the service sector [4], among them the hospital sector [14]. Hospitals are increasingly adding the precepts of CS and sustainable development to their business strategies and operational processes [15]. Because their operations occur, in general, 24 h a day uninterruptedly, they are among the organizations that consume the most natural resources, produce waste, emit polluting gases, and need an intense workforce to provide their services [16], which is aggravated by having to deal with unforeseen events, such as the demand arising from the COVID-19 pandemic [17]. Therefore, many hospitals have started to consider CS as an important approach to providing their services not only according to economic and health promotion criteria but also to environmental efficiency and social responsibility, which contribute to sustainable development [18]. Furthermore, hospitals are the central link in the healthcare service delivery chain [19], and by conducting studies to improve their management, positive impacts are generated on the other links of this chain.

Corporate sustainability in the health context has been discussed in the academic community, and some works dealing with its development and management are important inputs for this article. For example, [20] analyzed the role of human capital in sustainability management in hospitals and found that departmental approaches, in which each sector develops projects in isolation, hinder human capital development and negatively impact CS. Ref. [21] analyzed CS in the healthcare supply chain in emerging countries and proposed a framework for its management. Ref. [17] identified in the literature propositions and dimensions for service delivery only in public hospitals and, from them, proposed a framework for hospital managers to identify opportunities and improve service delivery to make it more sustainable. Ref. [22] conducted a bibliometric analysis on sustainable health management and found that the economic dimension receives greater importance than the environmental and social dimensions in the analyzed articles, which also indicates an imbalance among the pillars of sustainability in the area of health and must be combated.

These studies present relevant contributions to sustainability management in hospitals, but do not present recommendations that are structured, feasible, and adapted to

their reality. This scientific opportunity is corroborated by the research gap pointed out by [23], who indicated the need to develop new research that identifies good practices and proposes new approaches to support the development of sustainability in healthcare settings. Because of this, this paper fills this gap and expands and deepens the studies that came before it by making propositions that help hospitals become more sustainable.

Thus, the following research question guided this work: how is it possible to develop and manage sustainability in hospitals? To answer this question, the goal of this study is to propose a framework that includes drivers for the development and management of sustainability in hospitals. This will help hospitals become more committed to the well-being of society, the preservation of the planet, and their ability to compete against other health service providers.

After this introduction, Section 2 presents a synthesis of the theoretical framework for corporate sustainability; Section 3 details the research method; Section 4 presents the boosting elements of sustainability; and Section 5 proposes and discusses the drivers for developing and managing sustainability in hospitals. Finally, the conclusion, references, and appendix are presented.

2. Theoretical Framework

Hospital services are central to the well-being of society because the physical, mental, and economic health of a community or country is directly linked to the effectiveness and efficiency of this type of service [24]. However, hospitals are among the most complex organizations to be managed, with several peculiarities in their operational processes that are required for the functioning of their facilities and direct patient care. The instability of demand and the complexity of measuring the results of their intangible activities are great difficulties to be overcome. For example, it is possible to measure how many surgeries and consultations were performed, but it is not possible to measure how much health is being obtained [25]. The demand for hospital services has intensified considerably due to population growth, chronic diseases, and emergencies caused by unexpected conditions, such as COVID-19 [26,27]. Parallel to this, hospitals need to make the most of their natural and financial resources and improve their labor productivity without sacrificing the quality of the services they provide [28].

The hospital setting is dynamic, with activities that require quick decision-making that are subject to constant changes; many distinct but intensely interconnected tasks; and often involves simultaneous care performed by the same team. In this setting, time is a crucial factor for patient survival, which requires that resources be used optimally [14]. It is also characterized by a high turnover of clinical staff (technical/medical area) and the reasonable stability of administrative staff [29]. Besides these, one of the main challenges for hospital managers is to reconcile business interests with ethical and legal principles, because decisions based solely on administrative criteria are not always consistent with technical health criteria. They need to define and achieve organizational goals considering the triad "organization, professionals, and patients"; however, in hospitals, it is common for leadership positions to be held by doctors and nurses who are not prepared to perform management activities [26]. Therefore, these managers need to be trained to be able to balance administrative and health care activities without hampering the economic viability of the hospital [30].

Despite the peculiarities of hospitals, there are many similarities between them and other types of organizations. Private hospitals make financial investments with their own resources or from shareholders, and their main objective is to generate profits. Public hospitals, on the other hand, are financed by resources from taxes and donations, which must be effectively managed to keep within the parameters set by the responsible public agency. Therefore, both private and public hospitals must manage their revenues in a way that ensures their financial and operational soundness and efficiency. Thus, the financial management expected from a hospital is similar to that of a company, since they must seek maximum efficiency and effectiveness of processes to fulfill their role in health care

and ensure economic performance coupled with sustainable social and environmental performance [31]. These challenges indicate the need and opportunity for the development of scientific papers that discuss and present solutions for hospitals to remain resilient and sustainable, corroborating the research gap presented in the introduction of this article.

Many hospitals have invested in projects with sustainable initiatives without creating a system that provides continuous improvement and perpetuity. These watertight projects, in general, are of short duration and do not generate medium- and long-term benefits, increasing the chances of failure of actions aimed at sustainability, which generates a waste of resources (human, financial, infrastructure, time, etc.) [32]. It is important to create mechanisms to maintain the engagement of hospitals and their employees during the development period of programs and actions related to sustainability. Despite research with considerable evidence on the positive outcomes of sustainable initiatives in healthcare delivery, there is still a lack of studies with approaches that keep hospitals engaged [6]. It is also important that sustainability is seen as a process of development and adaptation in response to organizational and patient needs [33]. This view is supported by [14], who point out that hospitals' perspectives on sustainability must shift from a short-term to a long-term view in order to ensure organizational survival and viability. CS is represented by the economic, environmental, and social pillars, and its management is an important way for hospitals to be resilient and fulfill their mission of treating and saving lives [34].

Hospital processes and services are intensive in material, energy, and water consumption; they generate significant amounts of waste, especially toxic waste; and they have high carbon emissions [35]. Environmental management in hospitals to mitigate these impacts can be done by operationalizing the environmental pillar of CS, which involves the use of renewable natural resources, the mitigation of toxic gas emissions, and the implementation of environmental strategies, such as cleaner production, ISO 14001, green design [36], studies on energy efficiency [37], and the analysis of life-cycle impact assessment (LCA) in hospitals [38], etc.

Hospitals are under great pressure to reduce costs, improve operational efficiency, and maintain service capacity [32]. The management of hospitals can be achieved through the operationalization of the economic pillar of CS, which encompasses the development of policies and actions to generate added value for goods and services, and initiatives that help improve and optimize processes, conquer new markets, and responsibly increase the financial return on investments [6].

Social problems in hospitals are mainly related to employees who work long hours in a work environment of high variability and complexity, with a high burden of physical and psychological stress. These characteristics negatively impact the health and safety of employees and the quality of patient care [35]. The solution to these issues can be found in the operationalization of the social pillar of CS, which includes the training and development of human capital, promoting satisfaction, health, safety, and quality in the working conditions of its employees, which will be reflected in better patient care [39].

3. Research Method

This section details the methodological elements for the development of this work. This includes the methodological flow (Figure 1) and the description of its phases.
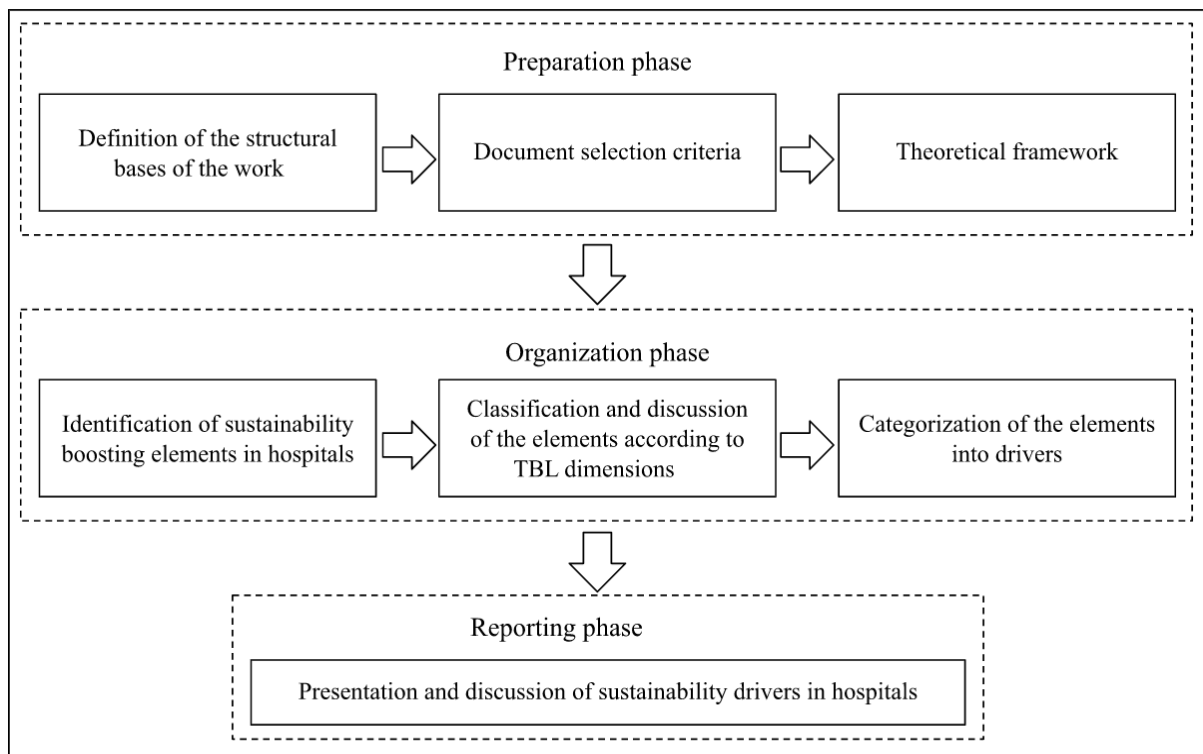
Figure 1. Methodological flow.

3.1. Preparation Phase

3.1.1. Definition of the Structural Bases of the Work

The first step of the work was to establish the structural basis necessary for its elaboration: definition, research gap, question, objective, and research method. The potential of the topic was selected through a search carried out in the Scopus database, which is one of the largest and most relevant interdisciplinary bases of peer-reviewed documents in the area of management and corporate sustainability in hospitals. From this search, it was identified the opportunity to propose drivers for the development and management of sustainability in hospitals. These drivers were proposed in order to incorporate all dimensions of sustainability into hospital practices and thus contribute more robustly to the current requirements of healthcare services. This was corroborated by the gap presented by [23], who stated that solutions need to be developed to improve sustainability in hospitals. From this, the authors defined the research question, the objective of the paper, and the research method. In this sense, this work was carried out through a qualitative approach based on the content analysis method.

Content analysis is a scientific method of analyzing textual data through a systematic process of identifying and coding units of analysis used to interpret documents whose results are concepts and categories that describe and allow the analysis of a given phenomenon [40]. Content analysis can be performed through inductive and/or deductive analysis [41]. In this study, the authors performed both analyses, and they will be explained in the organization phase.

Next, the unit of analysis was defined, which can be a letter, word, sentence, or excerpt about the object under investigation [42]. In this study, the unit of analysis selected was all the excerpts that pointed to actions for the development and management of sustainability in hospitals.

3.1.2. Document Selection Criteria

English language articles and review-type documents published between 2016 and 2021 were selected from the search query TITLE ((sustainability) OR (sustainable) OR ("cor-

porate social responsibility") OR ("CSR") OR ("sustainable development") OR ("global report initiative") OR ("GRI") OR ("triple bottom line")) AND TITLE ((hospital) OR (healthcare) OR ("health care")). After applying these filters, the search resulted in 449 documents. To select the 30 most influential articles (see Table A1 in Appendix A), that is, the most cited articles on sustainability in hospitals in the analyzed period, the titles, keywords, and abstracts of the documents obtained from the Scopus database were read. Thus, those in which sustainability in hospitals was addressed as a secondary aspect or those that referred to the sustainability of the governmental health structure and not sustainability in health organizations were excluded.

The restriction to papers in the period between 2016 and 2021 was because the most recently published papers present the innovations in sustainability in hospitals (SH) and incorporate the consolidated knowledge already developed. These 30 documents totaled 778 citations in all, which means that they served as a basis for several other studies and contributed significantly to the advancement of the state of the art in this topic. Once the documents were selected, they subsidized the construction of the theoretical framework and were subjected to content analysis.

3.1.3. Theoretical Framework

The theoretical reference about sustainability in hospitals was prepared based on the 30 most cited papers and, when necessary, other papers were added to support the fundamental concepts and characteristics that based the development of this work.

3.2. Organization Phase

3.2.1. Identifying Boosting Elements of Sustainability in Hospitals

Inductive analysis was carried out to identify the boosting elements of SH. Considering that the theme of sustainability in hospitals is still very dispersed and this type of analysis is used when knowledge about a certain theme is pulverized, the inductive analysis was adopted to contribute to the consolidation of this theme. There is no standardized way to perform inductive content analysis. Due to this, ref. [42] recommends that reliability should be evidenced from the quality of the description and execution of how the analysis was performed. Thus, this is explained as follows: after defining the unit of analysis of this study in the preparation phase, a thorough reading of the textual data began. As these units of analysis were identified, they were given alphanumeric codes to represent them, and the elements were constructed. Next, all units of analysis and their codes were reviewed, and codes related to content that had similar meanings were recoded and merged to become a single element. The coding was used to reference the elements in all subsequent analyses of the study. Finally, 30 boosting elements of SH were obtained from the identification of the units of analysis that were repeated and present contributions to this theme. They received identifiers from E1 to E30 and were arranged in decreasing frequency of occurrence in the articles, as shown in Table 1.

3.2.2. Classification and Discussion of the Elements according to the TBL Dimensions

As already mentioned, deductive analysis was also performed. This type of analysis is based on pre-existing structures, concepts, or theories for analysis and, as the theory about the environmental, social, and economic dimensions of the TBL is already well structured in the scientific literature, the process of classifying the elements within these dimensions meets the requirements of deductive content analysis [41]. Therefore, in this work, the elements previously identified during the inductive analysis were classified according to these dimensions through deductive content analysis to facilitate the reader's understanding of these elements in their respective TBL dimensions.

Table 1. Boosting elements of sustainability.

#	Elements	TBL	Most Cited Articles																													Freq.
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
E1	Perform hospital waste management	EN	x									x	x	x	x		x					x		x							x		9
E2	Consider environmental sustainability requirements in the design, construction, and operation of hospital facilities	EN					x					x	x	x	x			x				x		x									8
E3	Consider stakeholders' opinions and needs during the decision-making processes	EN/SO/EC			x		x					x				x						x			x		x	x					8
E4	Train employees and sensitize stakeholders and suppliers	EN/SO/EC		x	x							x		x		x						x						x					7
E5	Develop a culture of corporate social responsibility in hospitals	SO				x	x					x	x	x	x		x																7
E6	Make sustainable decisions shared with the other members of the hospital supply chain	EC/EN				x						x	x	x	x	x										x							7
E7	Use Health Technology Assessment (HTA) as a decision support tool	EC							x									x	x			x		x		x							6
E8	Create work teams for implementation and operationalization of sustainability	EN/SO			x							x		x								x						x					5
E9	Use management systems in hospitals	EN				x						x	x	x											x								5
E10	Adopt technological innovations to aid economic sustainability in hospitals and in the links of their supply chain	EC													x		x			x	x									x			5
E11	Define objectives, targets, and key performance indicators (KPIs) in hospitals	EN/SO/EC			x							x										x			x		x						5
E12	Engage employees in sustainable hospital projects	EN/SO			x							x					x					x											4
E13	Foster the creation and implementation of sustainable ideas	EN													x	x		x				x											4
E14	Develop the ability to be open to change	EN			x										x	x						x											4
E15	Insert sustainability criteria for supplier selection in hospitals	EN/SO/EC				x	x					x	x																				4
E16	Establish partnerships with material recycling companies	EN						x					x	x										x									4
E17	Adopt technological innovations to aid environmental sustainability	EN	x					x							x															x			4
E18	Consider social sustainability requirements in the design, construction, and operation of hospital building facilities	SO								x														x								x	3
E19	Reuse materials and instruments whenever possible	EN										x	x											x									3
E20	Adopt technological innovations to aid social sustainability	SO																x				x								x			3
E21	Employ corporate governance in the management of sustainable systems and processes	EC																x		x								x					3
E22	Develop public-private partnerships (PPP) in public hospitals	EC/SO																	x	x										x			3
E23	Develop and/or improve the sustainable procurement process	EC/EN											x	x			x																3
E24	Act as agents of pressure for the insertion of sustainability issues in the curricula of health courses	SO																x	x										x				3
E25	Encourage the active participation of human resources for the sustainable performance of hospitals	SO		x									x																				2
E26	Integrate sustainability into the mission, vision and policies of hospitals	EC			x																			x									2
E27	Develop partnerships for reverse logistics of hospital products	EN											x	x																			2
E28	Manage in a structured way the intellectual capital in all its dimensions (human, structural, and relational capital) in order to contribute to sustainability management.	SO																x				x											2
E29	Implement Lean Six Sigma methodology in hospitals to improve economic, social and environmental performance	EC														x	x																2
E30	Analyze the economic feasibility of using the technologies in the design, construction, operation of your buildings while considering environmental sustainability requirements	EC																							x						x		2

Notes: EC = economic sustainability; EN = environmental sustainability; SO = social sustainability.

3.2.3. Categorizing the Elements into Drivers

The elements were grouped by similarity into five drivers, i.e., each driver with its own set of boosting elements for the development and management of sustainability in hospitals. This data grouping process, called categorization or category creation, is recommended by [42] in studies that use content analysis to summarize and make sure that all the elements are understood and included.

3.3. Reporting Phase

Presentation and Discussion of Sustainability Drivers in Hospitals

Regarding the creation of categories, in this study called "drivers", they were presented and discussed in light of the literature and the authors' interpretation in order to report the results generated from this grouping.

Assessing the reliability of qualitative research is a process with a high burden of subjectivity [41]. It is worth noting that content analysis in its qualitative aspect relies on several assumptions that serve as support for extracting insights that are not always explicit. Moreover, a text can contain many meanings and be interpreted from different perspectives. Thus, the analysis of the textual data in this paper went through the judgment and interpretation of the authors, as is common in qualitative research. Therefore, the way the process was conducted can be repeated in the future and the results obtained are considered reliable.

4. Identifying the Boosting Elements of SH

This section presents the 30 boosting elements of corporate sustainability in the hospital setting. These elements were identified in the most influential literature on the topic, which provided the analysis of a wide range of knowledge produced and disseminated in the period between 2016 and 2021. Table 1 shows the 30 elements in order of how often they appear in the articles. They are arranged from most common to least common.

These elements contemplate several actions for the development and management of sustainability in hospitals and were analyzed under the prism of the three dimensions of TBL. To make it easier for the reader to understand, there is a column in Table 1 that lists these elements by their environmental (EN), social (SO), and economic (EC) dimensions.

The elements classified as environmental (30%) contemplate actions that aim to mitigate negative environmental impacts to the planet from hospital buildings and their operational processes. Thus, the elements contemplate the implementation of environmental management systems and tools [15]; the elaboration of eco-efficiency performance strategies and indicators [43]; the acquisition of environmentally friendly products, materials, and equipment [44]; and the provision of health services based on more sustainable operations and practices without reducing the quality of care [32].

The elements classified as social (20%) contemplate actions that aim at social benefits to patients, employees, and the surrounding community for valuing the people who are part of this ecosystem of health services provision. Thus, the elements contemplate, for example, the development of corporate social responsibility to embrace the surrounding community [6]; the valorization of human capital as an important resource for the organization [20]; improving technological resources for the well-being of patients [45]; working conditions, health, and safety for employees [15]; and the thermal, acoustic and visual comfort of the building facilities, benefiting both employees and patients [39] among others.

The elements classified as economic (20%) contemplate actions that contribute to reducing operational costs, increasing the efficiency and effectiveness of processes, and the financial development of hospitals, based on the establishment of strategies committed to sustainability. Actions such as investments in technologies [46]; the adoption of more sustainable business models [47]; the execution of public–private partnerships [48]; and the analysis of the economic viability of investments in an integrated manner with social and environmental concerns [36] stimulate the development and management of economic sustainability in hospitals.

The elements classified as environmental/social; economic/environmental; economic/social; and environmental/social/economic (30%) cover more than one TBL dimension or all three dimensions concurrently. Actions such as considering stakeholders' opinions and needs [7]; making sustainable decisions shared with the other members of the hospital supply chain [21]; and acting as agents of pressure for the insertion of sustainability issues into the curricula of health courses [49] are examples of actions that stimulate SH in a more systemic, integrated, and effective way from the perspective of sustainability dimensions.

5. Presentation and Discussion of Sustainability Drivers in Hospitals

The elements identified in the literature from the 30 most cited articles in the period from 2016 to 2021 were grouped into five drivers for developing and managing sustainability in hospitals, as shown in Figure 2.
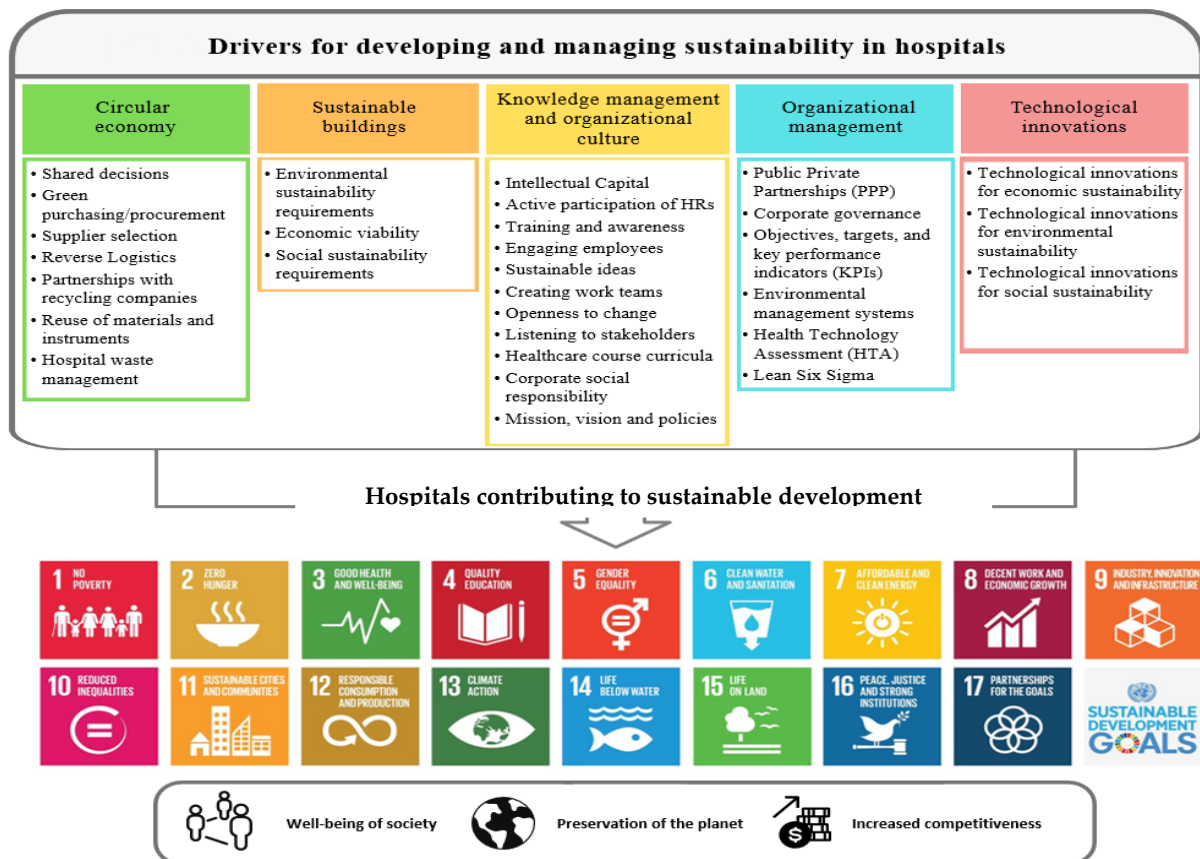

Figure 2. Drivers for developing and managing sustainability in hospitals to achieve the SDG goals.

It is worth noting that the set of elements of each driver was grouped according to the similarity of the themes addressed and discussed in the light of the literature and the expertise of the authors to enhance the results of their joint action.

5.1. Toward the Circular Economy

Circular economy is a new business model approach that encompasses the redesign of processes from the production of products and services to the disposal of waste. It focuses on circularity rather than linearity and aims to minimize resource extraction and optimize resource use. As such, circular economy can be seen as a promising approach to help meet global sustainability demands [50].

The development and management of SH is a challenging issue, and the supply chain in which hospitals are involved plays a dynamic and active role in this process [44]. For the development and management of SH, hospitals need to be inserted into a supply

chain that shares the same culture committed to the development of a circular economy. Otherwise, SH development and management become less effective since the services provided by hospitals and the fulfillment of all sustainability-related goals are hindered by the incompatibilities of the different visions and engagement of the organizations that make up the chain [17]. This synergy between the hospital and the other members of the supply chain to which it belongs strongly influences the practices and decision processes, positively impacting sustainability [21]. Thus, hospitals must "make decisions that impact sustainability in a shared manner with the other members of their supply chain (E6)" as a sustainable management strategy. This synergy is enhanced through long-term business relationships focused on sustainability, which demand the commitment of the entire chain. Furthermore, hospitals are institutions that should act as leaders that encourage sustainability within this complex chain, which includes several types of manufacturers, distributors, and suppliers.

In this context, although sustainable procurement is a common practice among hospitals that aim to develop sustainability, they face difficulties in finding information that can guide this process [51]. To help overcome this difficulty, the ISO 20,400 standard proposes guidelines for the sustainable procurement process that cover political and strategic aspects, aiming at the alignment of contracts with the hospital's sustainability objectives and goals [52]. It is important that hospitals "develop and/or improve the sustainable procurement process (E23)" to make good financial deals and bring benefits to society and the environment.

Another difficulty faced by hospitals is selecting sustainable suppliers because several criteria are used in decision making and often these criteria are conflicting [51]. In a traditional supply chain, the most important criteria for supplier selection are price, quality, and delivery, whereas in a sustainable supply chain, supplier selection also includes environmental (based on environmental impacts) and social (occupational, health, and safety issues) criteria [15]. The "insertion of sustainability criteria for hospitals' supplier selection (E15)" plays a key role in applying circular economy to the performance of sustainability of hospitals and their supply chains. Thus, it is recommended that hospitals consider this element during sustainability management to ensure that the working conditions of employees and their suppliers are appropriate, that the products or services purchased are sustainable, and that socioeconomic issues, such as inequality and poverty, are considered during their supplier selection.

In addition to the selection of sustainable suppliers, it is important to develop partnerships with suppliers to promote circular economy, focusing on practices to reduce, recycle, and reuse materials and reverse logistics is one of these practices that integrate SSC [21]. Several items can be destined for reverse logistics, from product packaging to expired medicines [53]. Hospitals should "develop partnerships for reverse logistics of hospital products (E27)" enabling recyclable products to be able to continue in the cycle and return safely to society, fulfilling their SSC path.

Similarly, hospitals are advised to "establish partnerships with material recycling companies (E16)" to promote circular economy. Ref. [54] cites examples of materials, such as paper and cardboard, plastic, glass, aluminum, electronics, batteries, light bulbs, TNT—Trinitrotoluene blankets, alcohol gel bags, syringes, cooking oil, thinner, and organic waste, which after being duly selected in the selective waste collection, can be sent for recycling instead of going to landfills. This element also promotes corporate social responsibility (CSR) with the local communities because the collaboration with recycling companies can be expanded to local seamstress cooperatives, craft fairs, and vocation schools, among others. These partnerships strengthen CSR, paving the way for the generation of value for the hospital and stimulating other similar initiatives [21].

The reuse of materials and instruments is a practice that has been advocated by circular economy and contributes to sustainability, as it provides for optimizing the use of reusable instruments and supplies and maximizing the reprocessing of single-use devices [55]. The "reuse of materials and instruments (E19)", always complying with the disinfection

criteria, is another important element that hospitals should develop to promote increased efficiency of available resources and avoid the emissions of pollutant gases generated in the manufacturing processes of new materials.

In the context of circular economy, waste is considered as input for the production of new products [47]. For this, it is necessary that hospitals manage this waste efficiently and safely, from its generation to its final disposal, including the selection of a supplier that meets the legal environmental requirements regarding the collection, transportation and allocation of waste in landfills, and partnerships with suppliers in the case of reverse logistics or with cooperatives to send the waste for reuse, recovery, recycling of materials, etc. [21]. The World Health Organization (WHO) has indicated that waste management should be more robust in view of the lack of strict legislation, inefficient management, and the growing increase in hospital waste generation, which has been causing severe impacts on public health and the environment [56]. It is essential that hospitals develop the element of "hospital waste management (E1)" to mitigate these impacts. To accomplish this, hospitals must comply with their country's legislation and adopt environmental management systems, such as ISO 14001. According to [57], an environmental management system based on ISO 14,001 contains requirements for the development and implementation of environmental policies to manage the environmental aspects of an organization's products or services.

5.2. Making Buildings Sustainable

Design, construction, operation, maintenance, and demolition are all stages of a building's life cycle that offer opportunities for the insertion of sustainability requirements. Sustainable buildings are buildings designed, constructed, and operated according to these requirements to increase their efficiency and decrease their impact on the environment and public health [58]. To this end, sustainable buildings adopt solutions and technologies for environmental preservation, saving natural resources, meeting the needs of the occupants, and reducing operating costs. Sustainability requirements are relevant elements that must be considered in the context of sustainable buildings and are usually studied according to the environmental, economic, and social pillars reflecting positively on the environment, on the satisfaction and comfort of its occupants, and on the hospital's business [43].

Environmental sustainability requirements are related to the rational and sustainable use of energy and water, the use of more sustainable materials during construction or maintenance, the sustainable use of land, the efficiency of the air conditioning and lighting system, and the environmental management of waste, among others [36,59]. Compliance with environmental requirements allows hospitals to use natural resources more efficiently in their operational processes [34]. As such, hospitals should "consider environmental sustainability requirements in the design, construction, and operation of hospital building facilities (E2)" to help balance resource consumption with the economic development of the institution.

When designing sustainable hospital buildings, technologies that enable results, such as lower waste generation, higher resistance to building deterioration, higher energy and water efficiency, environments with more comfort and healthiness to the occupants, and market valuation for the property, should be used [60]. All these results have an impact on the reduction of operational costs and return on the capital invested in the construction, maintenance, or renovation of the buildings, i.e., they reflect economic sustainability [43]. For example, the use of technologies aimed at reducing the energy consumption and emissions of pollutant gases enables economic benefits proportional to the financial investments made. Thus, it is recommended that hospitals "analyze the economic feasibility of using technologies in the design, construction, and operation of their buildings (E30)". The feasibility of each technology employed for more sustainable buildings needs to be studied in relation to its cost–benefit.

Social sustainability requirements, such as accessibility to social areas and the availability of public transportation, impact the perception of safety and physical and mental

well-being of building occupants (patients, visitors, and employees). Other social sustainability requirements are not always so obvious to understand, such as indoor air quality, thermal, acoustic, and visual comfort, but are equally relevant in this context. Incorporating these requirements into the design, construction, and operation of buildings plays a key role in hospital social sustainability management, benefiting patients and employees [36]. Increasing the level of patient satisfaction can speed up the recovery process and decrease the length of hospital stay, which is directly related to the decrease in hospital costs [61]. Regarding the benefits provided to employees, working in an environment with these characteristics is reflected in the reduction of medical errors, absenteeism, staff turnover, and productivity gains [39]. Regarding this aspect, hospitals should "consider social sustainability requirements in the design, construction, and operation of hospital building facilities (E18)" so that they can fulfill their people-centered social role and thus boost social sustainability.

5.3. Adopting Knowledge Management and Organizational Culture

What provides a sustainable competitive advantage to organizations is the knowledge they hold, the efficiency with which they use information, and the speed with which they make innovations from this knowledge. Tacit and explicit knowledge are converted into organizational knowledge with the aim of improving communication and decision making, bringing competitive advantages [62]. Knowledge management is the process of creating, sharing, using, and coordinating knowledge by making it available to the organization's employees, improving the connectivity between knowledge sources and users [63].

For knowledge management, many organizations develop their intellectual capital. Intellectual capital comprises human, structural, and relational capital. Human capital represents the sum of the knowledge, skills, experiences, creativity, and capabilities of an organization's employees; structural capital represents the knowledge that remains within the company such as organizational capabilities and commitments, knowledge management systems, reward systems, information technology systems, databases, operational processes, managerial philosophies, and organizational culture; and relational capital is made up of the knowledge generated in the organization's relationship with its stakeholders [20]. Hospitals should "manage in a structured way the intellectual capital in all its dimensions (human, structural, and relational capital) in order to contribute to sustainability management (E28)". By bringing all these dimensions of intellectual capital together, hospitals will be able to strengthen their workforce and relationships with their stakeholders and thus leverage social sustainability.

For the management of intellectual capital, the development of some elements considered essential is recommended: (1) "encourage the active participation of human resources for the sustainable performance of hospitals (E25)", because they play a key role in the organization's performance, which can lead to innovation and the efficient use of organizational resources to reduce threats and obstacles that hinder the achievement and maintenance of sustainability [6]; (2) "empower employees and sensitize stakeholders and suppliers (E4)" in order to enable the sharing of knowledge internally and in the supply chain [21]; (3) "engage employees in the sustainable projects of hospitals (E12)", where this engagement should come from the leadership through the effective communication of best practices, and by incentive systems that are able to recognize the effort and value of employee initiatives [64]; (4) "foster the creation and implementation of sustainable ideas (E13)", because by encouraging suggestions, hospitals encourage their employees to use and share their tacit knowledge to work together on solutions that contribute to sustainability [62]; (5) "create work teams for implementation and operationalization of sustainability (E8)", because these teams promote collaboration between individuals and facilitate the creation and implementation of new sustainable ideas. It is recommended that these work teams be composed of inter- and multidisciplinary teams, as this will bring together different expertise that will also help in problem-solving and improving projects in general. These work teams can act to build an organizational culture focused

on sustainability [33]; and (6) "develop the ability to be open to change (E14)", because the implementation of new work routines and proposals related to sustainability requires cultural and behavioral changes [47].

Another important element is related to the knowledge coming from stakeholders. This element is essential for sustainability management in hospitals since stakeholders (patients, community, employees, suppliers, R&D partners, shareholders, government, etc.) are an important source of information that can increase the expertise of the hospitals' human capital and thus boost the change towards sustainability [7,65]. For this, hospitals need to "consider the views and needs of stakeholders during decision-making processes" (E3).

It is also important that health professionals acquire knowledge in undergraduate and graduate courses about sustainability so that they understand both the impact of the environment (temperature, air humidity, etc.) on health, and the impact of the health system and its processes on preserving the environment [66]. Universities must insert in their curricula subjects related to this topic so that students can acquire the knowledge that adds to and strengthens a culture focused on sustainability and develop competencies in the elaboration and conduction of environmentally sustainable projects [49]. Hospitals, on the other hand, should "act as agents of demand for the insertion of sustainability issues in the curricula of health courses (E24)" so that professionals arrive in the job market better prepared for this new culture.

In addition, hospitals should align their culture with corporate social responsibility to establish their commitment to society through social and educational projects, philanthropy, ethics, and environmental preservation aimed at the public interest [6]. "Developing the culture of corporate social responsibility (CSR) (E5)" can help hospitals with sustainability as it provides a positive impact on society, the environment, and the satisfaction of their employees and patients, improving their organizational image and the relationship with their stakeholders.

Theoretical and empirical studies emphasize the importance of "integrating sustainability into the mission, vision, and policies of hospitals (E26)" [33]. Defining these strategic elements is important to direct the actions taken by hospital managers toward sustainability and to make clear what goals are intended to be achieved and what strategies will be adopted to do so.

5.4. Employing Management Systems, Tools, and Methods

Although sustainability principles have long been included in the business models of many organizations, healthcare organizations have only recently begun the process of implementing sustainability systems, methods, and tools. Like many other organizations, sustainability in the healthcare sector can be considered a strategic issue with social, environmental, and financial results. As market competitiveness increases, organizations need to innovate and adapt to new business models that incorporate sustainability in a structured way [18].

Public–private partnerships (PPP) are considered a business model that can add value to sustainability management in hospitals. In this model, public hospitals enter partnerships with the private sector with benefits for both parties. Through PPP, it is possible for hospitals to receive investments in technological innovations, which generate positive economic impacts, increasing business sustainability, and social impacts, improving access and the quality of patient care [48]. Therefore, it is advisable that hospitals "develop public–private partnerships (PPP) (E22)" because this business model can reshape traditional healthcare business models with savings and efficiency gains.

As with PPPs, corporate governance is another essential element that hospitals must consider in managing sustainability. Corporate governance is a system by which an organization is controlled to ensure that organizations can be trusted with regard to transparency and accountability; corporate responsibility; mechanisms to deal with conflict; methods to improve the quality of systems and processes; and procedures, guidelines, and protocols for decision making [67]. Sustainability management is a complex task and governance can

help hospitals in this challenge because it focuses on ensuring the integrity and seriousness of organizational management. For this, it is recommended that hospitals "use corporate governance in the management of sustainable systems and processes (E21)" to develop sustainability strategies, acting in a way that adds value to the business, the community, and the environment.

In this scenario, hospitals must focus on managing strategies, processes, and practices that optimize healthcare considering sustainability aspects. Hospitals should develop a strategic plan to help them define which direction to take to achieve and improve sustainability effectiveness [43]. It is necessary to "define objectives, targets and key performance indicators (KPIs) for hospitals (E11)". This element, from strong governance, contributes to the management of sustainability at the strategic, managerial, and operational levels, helping in the processes of decision making, performance improvement, and the implementation of corrective actions, etc.

The ISO 14001 (Environmental Management) and ISO 50001 (Energy Management) standards are being used in many hospitals with benefits evidenced in empirical studies. They help hospitals to implement an environmental policy which results in the better use of natural resources, the minimization of waste, the optimization of processes, and increased productivity [44]. Sustainability management should "use management systems in hospitals (E9)" to improve the eco-efficiency of hospital processes, which will certainly make a difference in the quality of services provided, the preservation of the environment, and the longevity of the business.

Health Technology Assessment (HTA) is a tool to evaluate the possible benefits and risks at the moments of investment and disinvestment of health technologies in hospital settings, considering the following aspects: safety; accuracy; efficacy; cost-effectiveness; and equity, ethical, cultural, and environmental aspects [46]. Health technologies are medicines, equipment, clinical and surgical procedures, and support systems in health care for risk prevention, diagnosis, treatment, and rehabilitation [68]. Investment means incorporating and using health technologies to achieve the maximum benefits from the aspects mentioned above and disinvestment means the partial or total withdrawal of health technologies that are not meeting these benefits [69]. It is recommended that hospitals "use Health Technology Assessment (HTA) as a decision support tool (E7)" to achieve three important benefits: 1. obtain information that will assist in the appropriate use of these technologies through the assessment of their clinical properties and their possible effects on patient health; 2. obtain financial resource savings through cost-effectiveness analysis that will impact business and quality of care; 3. enable hospital managers to make more assertive decisions during the investment and disinvestment of technologies in which they will have financial, social, and environmental impacts.

Lean Six Sigma is a management method that, from the mapping of activities that do not add value to operational processes, allows the elimination of waste and the reduction of variability. In the hospital setting, this method contributes to the continuous improvement of these processes, organizational productivity, patient care, and the rational use of resources, thus positively impacting the economic, social, and environmental sustainability of hospitals [32,70]. Thus, the element "implement Lean Six Sigma in hospitals (E29)" can help hospitals become more efficient and sustainable in providing higher quality health care services.

5.5. Applying Technological Innovations

Hospitals have been investing in Technological Innovations (TIs), such as use of 3D printing technology, telemedicine, cloud computing, electronic medical records, virtual reality, smart wearable devices, big data, internet of things, robotics, automated dosing medical equipment, and artificial intelligence, among others [71,72]. Incorporating technological innovations plays a key role in hospital sustainability management benefiting patients and employees, hospitals, the members of the supply chain, and the environment [20].

TIs assist hospital management and hospital supply chain resilience and directly and positively impact economic sustainability [47]. From them, it is possible to obtain information that assists in decision making; in the exchange of patients' medical data within and between health institutions; and in tracking patient data, bringing agility and security to operational processes and clinical care. They also allow hospitals to integrate real-time information between administrative departments; reduce overcrowding and queues; reduce costs from simulations and "smart" savings; and integrate the supply chain, expanding communication, data sharing, flexibility, and productivity [45]. Therefore, hospitals should "adopt technological innovations to aid economic sustainability in hospitals and the links of their supply chain (E10)" as a driver for sustainability management.

TIs also contribute positively to environmental sustainability in hospitals by mitigating negative impacts from hospital operational processes [48]. Some examples of its application are the use of telemedicine enables remote care, which reduces the amount of travel and consequently the emission of pollutant gases [20]; electronic medical records limit the use of paper and decrease the amount of waste [71]; real-time energy consumption tracking software assists in energy management and efficient energy use [60]; and automated weighing systems assist in waste management [56], etc. Therefore, it is advisable to "adopt technological innovations to improve environmental sustainability (E17)" because based on them, it will be possible to manage natural resources more efficiently; reduce the emission rate of pollutant gases; and control the generation, treatment, and disposal of waste.

In addition, TIs have positive impacts for social sustainability from the benefits they bring to patients and employees. For patients, these impacts are present from face-to-face care to care that can also be provided virtually outside the hospitals [71]. In addition, these innovations increase the ability of patients to control their own illnesses with the direct and remote supervision of healthcare professionals. This is made possible by telemedicine equipment, such as cameras, sensors, and telephone/internet connections, that record vital signs and other patient parameters that are sent directly to the responsible physicians [48]. Regarding healthcare professionals, technological innovations improve the assertiveness of diagnoses, reduce errors, and assist in computer-aided drug dosage calculation systems, etc. These and countless other benefits make healthcare services more efficient and effective. In turn, healthcare professionals can make better decisions; access information remotely and in real time; reduce emotional stress, etc. [20,73]. Therefore, hospitals should "adopt technological innovations to improve social sustainability (E20)" because based on them it will be possible to make better diagnoses and prescribe more effective treatments, increasing the life chances of many patients and promoting employee satisfaction, health, and safety.

By presenting and discussing the proposed drivers, this study answered the following research question: how is it possible to develop and manage sustainability in hospitals? Based on the content analysis performed on the selected scientific literature, it can be determined that the proposed drivers will help hospitals manage sustainability in a systemic way because they encompass the three dimensions of sustainability (TBL), which in the business field is called corporate sustainability. According to [74], when actions aimed at CS are developed in order to encompass more than one dimension of sustainability by integrating these dimensions, the results of these actions can be enhanced. Thus, this study proposes drivers directed to the development and management of CS in hospitals that are transversal to the TBL dimensions, i.e., they encompass the economic, social, and environmental dimensions. Moreover, they are interrelated and the development of each one supports the development of the others.

However, it is important to emphasize that some hospitals are more developed than others in sustainability management and face some challenges with greater or lesser intensity depending on their peculiarities. In this sense, the proposed drivers should be developed and prioritized according to the degree of development in sustainability (awareness of the theme, development of actions and projects, availability of resources, etc.) of hospitals. Thus, they can be implemented sequentially or even in parallel.

6. Conclusions

This work proposes a framework containing drivers to develop and manage sustainability in hospitals, thus filling the scientific gap that indicated the need to develop solutions for sustainability adapted to the reality of healthcare institutions settings. Reaching this goal also enabled the research question "in what way is it possible to develop and manage sustainability in hospitals?" to be properly answered. This work was carried out using the method of "content analysis" of the 30 most influential articles on SH between 2016 and 2021. As a result, five drivers for the management and development of SH were proposed, enabling public and private hospitals to develop actions in the three pillars of TBL.

This work contributes scientifically and theoretically to the academic maturation of the topic of sustainability in hospital settings by systematizing elements and adding insights to the state of the art on SH. The proposition of drivers based on structuring elements deepens and expands the studies already conducted on the subject, providing a basis for the development of new research and a reference point for the analysis and discussion of empirical studies. As an applied-managerial contribution, the proposed drivers assist public and private hospital managers in developing and managing sustainability in order to make their businesses fairer, greener, and more prosperous and fulfill their commitments to the well-being of their employees and society.

The provision of hospital services based on sustainability has the potential to contribute to sustainable development by evidencing environmental, social, and financial benefits that go beyond the hospital itself. A collective movement for the development of sustainability in hospitals will positively impact the other companies that are part of their supply chain, reflecting in gains for society and the ecosystem. In this work, the three dimensions of sustainability were dealt with jointly, culminating in drivers to help hospitals equate sustainability in an integrated manner, providing a basis for a movement towards the premises of the United Nation's Agenda 2030. This agenda signals the need to create strategies that improve health and education, reduce inequality, stimulate economic growth, and combat climate change. Therefore, it is imperative that hospitals make contributions, act cooperatively by sharing knowledge among themselves, and be inspiring examples to other service sector companies.

The framework proposed in this study can be expanded if a larger number of articles is considered in future research because, in this way, other important aspects for the development and management of sustainability in hospitals can be added. Therefore, it is recommended that future studies increase the number of papers analyzed and continue the study of the fundamental bases of the development and management of sustainability in hospitals developed in this work, adding new elements to the drivers, or even proposing new drivers for the continuous scientific advancement of this topic. Other opportunities for future studies concern how other health care organizations, such as clinics, laboratories, dental offices, and veterinary offices and their workforces, can become sustainable by adopting practical solutions that strengthen their social, environmental, and economic roles.

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Appendix A

Table A1. The 30 most cited articles in Corporate Sustainability in Hospitals from 2016 to 2021.

No.	Title	Author(s)/Year	Journal	Times Cited (17 February 2021)
1	A hybrid multi-criteria decision-making method approach for selecting a sustainable location of healthcare waste disposal facility	Chauhan and Singh (2016)	Journal of Cleaner Production	73
2	Progressing in the change journey towards sustainability in healthcare: The role of 'Green' HRM	Pinzone et al. (2016)	Journal of Cleaner Production	72
3	Navigating the sustainability landscape: a systematic review of sustainability approaches in healthcare	Lennox, Maher, and Reed (2018)	Implementation Science	54
4	Sustainable supplier selection in healthcare industries using a new MCDM method: Measurement of alternatives and ranking according to Compromise solution	Stević et al. (2020)	Computers and Industrial Engineering	49
5	Exploration of social sustainability in healthcare supply chain	Hussain et al. (2018)	Journal of Cleaner Production	37
6	A review of sustainable energy access and technologies for healthcare facilities in the Global South	Franco et al. (2017)	Sustainable Energy Technologies and Assessments	31
7	Envisioning smart and sustainable healthcare: 3D Printing technologies for personalized medication	Aquino et al. (2018)	Futures	29
8	Social sustainability in healthcare facilities: a rating tool for analyzing and improving social aspects in environments of care	Capolongo et al. (2016)	Annali dell'Istituto Superiore di Sanita	29
9	Cataract surgery and environmental sustainability: Waste and lifecycle assessment of phacoemulsification at a private healthcare facility	Thiel et al. (2017)	Journal of Cataract and Refractive Surgery	25
10	The impact of green human resource management practices on sustainable performance in healthcare organizations A conceptual framework	Mousa and Othman (2020)	Journal of Cleaner Production	24
11	Public healthcare practices and criteria for a sustainable procurement A comparative study between UK and Italy	Chiarini, Opoku, and Vagnoni (2017)	Journal of Cleaner Production	23
12	A proposed healthcare supply chain management framework in the emerging economies with the sustainable lenses: The theory, the practice, and the policy	Scarvada et al. (2019)	Resources, Conservation & Recycling	22
13	The healthcare sustainable supply chain 4.0: The circular economy transition conceptual framework with the corporate social responsibility mirror	Daú et al. (2019)	Sustainability	22
14	Lean six sigma and environmental sustainability: A hospital perspective	Zhu, Johnson, and Sarkis (2018)	Supply Chain Forum	22
15	Does intellectual capital promote the shift of healthcare organizations towards sustainable development? Evidence from Italy	Cavicchi and Vagnoni (2017)	Journal of Cleaner Production	21
16	Fulfilling a new obligation: Teaching and learning of sustainable healthcare in the medical education curriculum	Tun (2019)	Medical Teacher	19
17	Enhancing the sustainability and climate resiliency of health care facilities: a comparison of initiatives and toolkits	Balbus et al. (2016)	Pan American Journal of Public Health	19
18	Sustainability in health care by allocating resources effectively (SHARE) 3: examining how resource allocation decisions are made, implemented, and evaluated in a local healthcare setting	Harris, Allen, Waller et al. (2017)	BMC Health Services Research	18
19	Sustainability in Health care by allocating resources effectively (SHARE) 1: introducing a series of papers reporting an investigation of disinvestment in a local healthcare setting	Harris, Green, Ramsey et al. (2017)	BMC Health Services Research	18

Table A1. *Cont.*

No.	Title	Author(s)/Year	Journal	Times Cited (17 February 2021)
20	Healthcare sustainability and the role of intellectual capital	Cavicchi (2017)	Journal of Intellectual Capital	18
21	Big Data for the Sustainability of Healthcare Project Financing	Visconti and Morea (2019)	Sustainability	17
22	Sustainability in Health care by Allocating Resources Effectively (SHARE) 2 identifying opportunities for disinvestment in a local healthcare setting	Harris, Allen, King et al. (2017)	BMC Health Services Research	17
23	Development of a healthcare building sustainability assessment method - Proposed structure and system of weights for the Portuguese context	Castro, Mateus, and Bragança (2017)	Journal of Cleaner Production	17
24	Health technology performance assessment: Real-world evidence for public healthcare sustainability	Guerra-Júnior et al. (2017)	International Journal of Technology Assessment in Health Care	16
25	Motivators of social sustainability in healthcare supply chains in the UAE-Stakeholder perspective	Khan et al. (2018)	Sustainable Production and Consumption	15
26	Sustainability in health care by allocating resources effectively (SHARE) 4: exploring opportunities and methods for consumer engagement in resource allocation in a local healthcare setting	Harris et al. (2017)	BMC Health Services Research	15
27	Identification of core objectives for teaching sustainable healthcare education	Teherani et al. (2017)	Medical Education Online	15
28	Can Public-Private Partnerships Foster Investment Sustainability in Smart Hospitals?	Moro Visconti et al. (2019)	Sustainability	14
29	Implementation of a multi-variable regression analysis in the assessment of the generation rate and composition of hospital solid waste for the design of a sustainable management system in developing countries	Al-Khatib et al. (2016)	Waste Management & Research	14
30	Healthy and Sustainable Hospital Evaluation-A Review of POE Tools for Hospital Assessment in an Evidence-Based Design Framework	Brambilla and Capolongo (2019)	Buildings	13

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