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Abstract

The Sustainable Development Goals agreed by the United Nations in September 2015 comprise 17 goals and 169 targets aimed at integrating matters related to sustainable development into the overall economic, environmental and social frameworks of countries. Whereas the SDGs have a global dimension, their action implementation depends on the level of priority different countries give to them, and on how sustainability issues compete with a country´s main problems. The aim of this paper was to identify the main Sustainable Development Goals approached by experts from different geographic regions, according to their experience and research area, and to discuss the relation between these goals and the main local issues and challenges of each region. The methodology starts with snowball sampling to collect information from experts from all geographic regions, through contact networks of universities in different countries. With the information about the goals researched by the participating experts, an analysis of the relation between the study focus and the geographical regions of origin was conducted. A total of 266 specialists from North America, Latin America/Caribbean, Africa, Asia, Europe and Oceania participated in the survey. Based on the sample used, it can be said that there is a relation between the local problems or challenges observed in some regions and the main areas of interest of the surveyed experts, with a general emphasis on the study of goals 4, 11 and 13. Based on the data gathered, the paper presents a set of examples of positive and negative situations in the various regions, and considers the extent to which some Sustainable Development Goals are being pursued by research on a worldwide basis.

1. Introduction

The last 30 years have been marked by numerous advances in discussions on sustainable development. Greater progress has been observed in industrialised countries, but many developing countries have also realized the need to seek sustainability. The concept of sustainable development was defined by the World Commission on Environment and Development through its Brundtland report, a document entitled *Our Common Future*. According to this report, sustainable development should "meet the necessities of the present generation without harming the future generation's capacity to meet their own" (WCED, 1987).

In this context, the United Nations (UN) plays a key role because it is constantly working to assist countries to overcome current and future sustainability challenges. Through conferences, for example, it proposes agreements related to sustainable development at many levels and for the entire international community. The 2012 UN Conference on Sustainable Development (UNCSD), also known as "Rio+20", is considered an historical event since it marked the 20th anniversary of the 1992 UN Conference on Environment & Development, both held in Rio de Janeiro, and the 40th anniversary of the 1972 UN Stockholm Conference on the Human Environment. These events, along with many others, represent the growth of

international cooperation on sustainable development and help set actions to make the world a better place to live in.

In 2001, because of the Millennium Summit, also held by the UN, the Millennium Development Goals (MDGs) were approved. These goals set eight initiatives to make the world a better place to live by 2015, focusing on hunger, poverty, education, gender equality, health and the environment, being the social goals with more positive results (McArthur and Rasmussen, 2018).

However, since 2000, there remained a concentration of old problems worldwide, plus the emergence of new and more complex challenges, in relation to a wide range of issues (Orzes et al., 2017). Thus, in 2015, the Sustainable Development Goals (SDGs) were created, serving as a continuation of the MDGs, but this time with a set of goals and targets to be achieved by 2030.

The SDGs are an integral part of the 2030 Agenda, which is a formal declaration adopted by the UN members and is a global action plan to seek sustainability in all countries. The Agenda has 169 targets and various indicators for monitoring, guided by the 17 Sustainable Development Goals, managing economic, environmental and social dimensions (Dlouhá and Pospíšilová, 2018; United Nations, 2016), as shown in Table 1. The goals are regarded as the most salient points for understanding and achieving environmental and human development ambitions up to 2030. Research related to them has begun to emerge in several disciplines in the academic world (Bebbington and Unerman, 2018).

Table 1 – The 17 Sustainable Development Goals and their description

1	No poverty	End poverty in all its forms everywhere
2	Zero hunger	End hunger achieve food security and improved nutrition and promote sustainable agriculture
3	Good health and well-being	Ensure healthy lives and promote well-being for all at all ages
4	Quality education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
5	Gender equality	Achieve gender equality and empower all women and girls
6	Clean water and sanitation	Ensure availability and sustainable management of water and sanitation for all
7	Affordable and clean energy	Ensure access to affordable, reliable, sustainable and modern energy for all
8	Decent work and economic growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
9	Industry, Innovation and Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
10	Reduced inequalities	Reduce inequality within and among countries
11	Sustainable cities and communities	Make cities and human settlements inclusive, safe, resilient and sustainable
12	Responsible consumption and production	Ensure sustainable consumption and production patterns
13	Climate action	Take urgent action to combat climate change and its impacts
14	Life below water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
15	Life on land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss
16	Peace, justice and strong institutions	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

17	Partnerships for the goals	Strengthen the means of implementation and revitalize the global partnership for sustainable development

Research, innovation and sustainable education are important mechanisms to achieve the Sustainable Development Goals. Such actions can only be done through substantial investment, both public and private. Indeed, a multi-stakeholder approach – involving academia, the national, regional and local governments, private sector, civil society, international organizations - will be fundamental to the practical application of the research's results.

Considering the situation, incentives for research on sustainability are even more important, allowing the preservation of the physical environment, economic efficiency and social equity, and represents a stage of the alliance between sustainable development and existing policies in order to achieve the SDGs (Leal Filho et al., 2018a).

According to Leal Filho et al. (2018a), the SDGs are an opportunity to encourage sustainability research, since the progress which has been made so far did not prevent humanity from exceeding its limits and natural resources. The authors emphasize the importance of interdisciplinary and transdisciplinary character of sustainability research, and the development of sustainable research at the local level to properly understand the impacts of local decisions on a broader scale.

Although the Sustainable Development Goals have a global approach, the actions taken are local and tend to depend on how far the countries are from achieving these goals. Besides that, the degree of development and commitment to sustainability of each country affects its internal interests and actions. Therefore, the aim of this paper is to identify the main SDGs addressed by experts from different geographical regions, according to their experience and research area, and to discuss the relation between these SDGs and the main local issues and challenges in each region.

After a few years into the SDGs, there are numerous studies about indicators used to measure them, how to monitor progress and evaluate performance in different regions and about the importance of teaching and researching for sustainable development (Annan-Diab and Molinari, 2017; Dlouhá and Pospíšilová, 2018; Galli et al., 2018; Hák et al., 2016; Muff et al., 2017; Storey et al, 2017; Sustainable Development Solutions Network, 2015; United Nations, 2017a; World Bank, 2017a). However, there are very few publications focusing on the extent to which the SDGs are being reached worldwide and the challenges seen across geographical regions, which justifies the development of this research and its contribution to theory (Whetten, 1989).

Since theory is a reflection of a system of knowledge production (Suddaby, 2014), this paper also intends to contribute to theory by identifying how much attention experts around the world are giving to the SDGs and listing emerging issues related to the challenges in each region.

1.1 Global and Regional Issues regarding Sustainable Development Goals

Many sustainability frameworks at national level has been developed in recent years to better manage a country's sustainability (Muff et al., 2017). They have been developed by different organizations, such as the United Nations (United Nations, 2016; United Nations, 2017a), OECD (2018), RobecoSAM (2018) and SDG Index (Sachs et al., 2017) and show the increasing importance of the issues and challenges addressed.

Likewise, many universities have been able to systematise the work they perform, by means of sustainability policies (Leal Filho et al., 2018b). Aligned with this and the

implementation of the 2030 Agenda for Sustainable Development, there is a framework of indicators and statistical data to monitor progress, inform policy and ensure accountability by all stakeholders. A global indicator framework was adopted by the General Assembly on 6th July 2017 and is contained in the Resolution adopted by the General Assembly on the Work of the Statistical Commission pertaining the 2030 Agenda for Sustainable Development. Two reports were recently published highlighting both gains and challenges as the international community moves towards full realization of the ambitions and principles espoused in the 2030 Agenda (United Nations, 2017a, 2017b).

The approach used to monitor the goals and their achievements has also been published in other reports, some related to countries´ performances (Sachs et al., 2017), whereas others are related to continents or regions performances (OECD, 2017; World Bank, 2017a).

North America, with population of 491 million people and Gross domestic product (GDP) of approximately US$ 22.2 Trillion (World Bank, 2017b), faces major challenges on sustainable consumption and production (SDG12), climate change (SDG13) and ecosystem conservation (SDG15). In the United States, agricultural systems are unsustainable, and rates of obesity are high, triggering malnutrition. US also experiences challenges in achieving the SDG 17 because of their insufficient financial contributions towards international development cooperation, banking secrecy, or unfair tax competition (Sachs et al., 2017). Canada is a country with good situation in health and well-being, education and affordable and clean energy. Its challenges are in SDGs 12, 13 and 15 (BCCIC, 2017; Sachs et al., 2017). In this continent, Mexico has a differentiated performance, facing major challenges in achieving goals related to hunger, education, affordable and clean energy, work and economic growth, infrastructure, sustainable cities, reduced inequalities, life on land and justice and strong institutions (Sachs et al., 2017).

With 1.2 billion people and GDP of US$ 2.2 Trillion (International Monetary Fund, 2017; World Bank, 2017b) the African Continent presents different SDGs' performances across the various regions. For instance, North Africa encounters challenges in achieving food security, sustainable agriculture and sustainable water management. There are also challenges in achieving gender equality in some countries. Elsewhere, many countries experience high rates of unemployment, challenges in decarbonizing their energy systems to fight climate change and in conserving marine and terrestrial ecosystems. Poor performance across the full range of SDGs owing to instability and conflict is noticed in some regions in Africa, which also relates to SDG16 (Sachs et al., 2017). The Sub-Saharan Africa is one of the world's poorest regions and faces nearly across-the-board challenges in meeting the SDGs. Large challenges remain in ending extreme poverty and hunger, health, education, and access to basic infrastructure (SDGs 6 - 9), while noting the tremendous progress that was made in many of these areas under the Millennium Development Goals. The other SDGs also highlight the need for urgent action for this region, such as sustainable urban development and reducing inequality. Similarly, significant challenges remain on SDG16, including peace, security and institutions (Sachs et al., 2017). According to Nicolai et al. (2016a) only SDG 17 and SDG 8 will be close to meeting their target in 2030. Most targets (SDGs 1-7, 9, 10 and 15) are moving in the right direction, but progress needs to be hastened considerably to meet the goals. Finally, present trends for targets of five goals – on cities, oceans, waste, climate change, and peace - suggest that these outcomes are getting worse.

Despite the differences among countries in Asia, which has population of 4.5 billion people and GDP of US$ 28.2 trillion (World Bank, 2017b), it can be said this region has been making good progress in providing social services and access to basic infrastructure, reducing poverty, improving water and sanitation and energy access. Some significant shortfalls are still observed, so these goals must keep receiving investments to guarantee the targets are met.

Many challenges are observed in environmental sustainability (SDGs 11, 12, 13 and 14), so these goals should receive a reversal in current trajectories (Nicolai et al., 2016b). The same can be said about goals related to improved nutrition, sustainable agriculture, hunger and health and in an even more worrying situation are goals on education, gender inequality and insecurity (Sachs et al., 2017).

According to a recent monitoring report on progress towards the goals (European Union, 2017), Europe has been making significant progress in improving energy productivity, reducing consumption and increasing the share of renewable sources in their matrix, in resource productivity, waste generation and treatment and CO_2 emissions, in health determinants and life expectancy at birth, in quality of life and reduced environmental impacts and in management of forest areas and water quality, although reports on different indicators conclude that the status of ecosystems and biodiversity in Europe has not sufficiently improved. On the other hand, other SDGs had moderate progress, such as those related to inequality in income distribution among countries, decrease in number of people at risk of poverty or social exclusion, increased ammonia emissions from agriculture, differences in the participation of women and men in the labour market and unemployment rate. This region has population of 742 million and GDP of US$ 20.2 billion (World Bank, 2017b).

According to Sachs et al. (2017), when it comes to Latin America and the Caribbean – with population of 516 million and GDP of approximately US$ 5 trillion (World Bank, 2017b) – insecurity and violence are major challenges, as well as improvements in the health system, education and poor nutrition. The environmental aspects also present challenges for these regions (SDGs 12, 13, 14 and 15), and improvements need to be made in order to meet goals related to innovation and employment outcomes. Although Sachs et al. (2017) consider inequality a critical challenge, results presented by Nicolai et al. (2016c) show this SDG has made considerable progress over the past two decades, probably because inequality had been so extreme in some regions. Actions to end poverty and improve energy access in Latin America/Caribbean also represent positive efforts (Nicolai et al., 2016c).

As reported by Sachs et al. (2017), countries from Oceania have similar patterns of SDG achievement. This region, with population of 40 million people and GDP of US$ 1.5 trillion (International Monetary Fund, 2017; World Bank, 2017b), presents good results in combating poverty, health and aspects of sustainable city, such as small amount of emissions and improved water source. Other SDGs have increased distance from targeted achievement, including obesity and sustainable agriculture, E-waste and emissions, CO_2 emissions, Ocean Health Index, overexploitation, and changes in forest areas.

1.2 The role of science in the implementation of the SDGs

The 2030 Agenda has global coverage, so it is essential to take action everywhere. The SDGs also need to be pursued in parallel, to yield the expected benefits. The success of the SDGs is directly related to the strengthened collaboration of its actors. In this sense, the scientific community helps in the translation of the global goals into practical national and local levels agendas.

Agenda 21 formalized nine sectors of society, called Major Groups, with the aim of a broad participation with UN sustainable development activities. Twenty years later, the Rio+20 Conference reaffirmed their importance and invited other collaborators to participate of the discussions concerning sustainable development (United Nations, 2018).

On September 2013, a UN Secretary-General announced, for the first time, the creation of the Scientific Advisory Board to bring together leading scientists "in an effort to influence and shape orientations at the multilateral level to advance sustainable development and poverty eradication worldwide" (UNESCO, 2017).

According to some authors, research is a favorable path to promote sustainability. Peter Strohschneider defends the view that "as a knowledge society, we necessarily rely on scientific research when we try to chart the course towards a sustainable future" (Schmalzbauer and Visbeck, 2016). Soini et al. (2018) also mentioned that academic research is typically motivated by a researcher's interest in increasing the academic knowledge of a given phenomenon, as the field of sustainability science at universities, for example.

Sustainability research should use a transformative approach because it is multidisciplinary, so it brings together different disciplines to solve society problems. Therefore, universities worldwide are experiencing a growing trend to respond to the need for sustainability and a number of knowledge gaps (Décamps et al., 2017; ICSU, 2017; Soini et al., 2018).

Member states of the 2030 Agenda stated that the development of policies for its implementation should be evidence-based grounded on a scientifically sound and consistent approach (Schmalzbauer and Visbeck, 2016). In this sense, science advice can support the findings of effective solutions from multifaceted challenges and direct the next steps. One of the reasons is that besides the present conditions, science also contributes to project and model future scenarios.

Networks between scientific and non-scientific stakeholders ensure the flow of information providing conditions to share technologies and knowledge, as well as open space for innovation, and catalyze local change (Dlouhá et al., 2017). In this way, science and research offer a start point for policy-makers to set priorities and initiate their action (ICSU, 2017).

2. Methodology

The first step of this paper was to conduct a survey on the Sustainable Development Goals, gathering information from experts from different countries. To do so, the snowball sampling method was used, in which a group of individuals was chosen to compose the sample, and, in the sequence, these individuals could suggest others to participate in the survey. This builds on previous studies which have analysed the ways countries pursue the SDGs (Cameron et al., 2016), the overall role of sustainability sciences in the implementation of the SDGs (e.g. Saito et al., 2017) or the role of sustainability indicators (Lehtonen, Sébastien, Bauler 2016).

According to Noy (2008) snowball sampling is arguably the most widely employed method of sampling in qualitative research in various disciplines across the social sciences. The initial contact was made with networks of contacts with universities from different countries, from all continents, requesting the following information: name, organisation, position, country and which Sustainable Development Goals represent their area of expertise and research. These initial contacts also forwarded the research invitation to their contacts; thus, there was no control of how many people received the invitation to send the information. The data collection was performed during a month, from 22nd March to 30th April 2017.

Along with this survey, the experts were invited by the Inter-University Sustainable Development Research Programme - IUSDRP (https://www.haw-hamburg.de/en/ftz-nk/programmes/iusdrp.html) to become members of the recently set-up "Working Group on the Sustainable Development Goals". The group members have the purpose of working together in writing research proposals, publication of join scientific work in peer-reviewed journals, and in the organization/execution of specialist events focusing on the SDGs.

Further, based on the results of the first stage, an analysis of the information received from all experts was conducted. This analysis focused on: a) verifying research trends of each

studied region by analysing the SDGs pointed out by each group of experts; and b) identifying, globally, the focus of attention and possible gaps when it comes to SDG studies.

After sending the invitation note through e-mail to the research participants, replies were received from 266 experts. Figure 1 shows the geographical distribution and Figure 2 illustrates the percentage according to each region. Out of the 266, 37 experts are from North America, 28 from Latin America/Caribbean, 55 from Africa, 53 from Asia, 87 from Europe and 6 from Oceania.

Figure 1 - Geographical distribution of the experts participating in the research

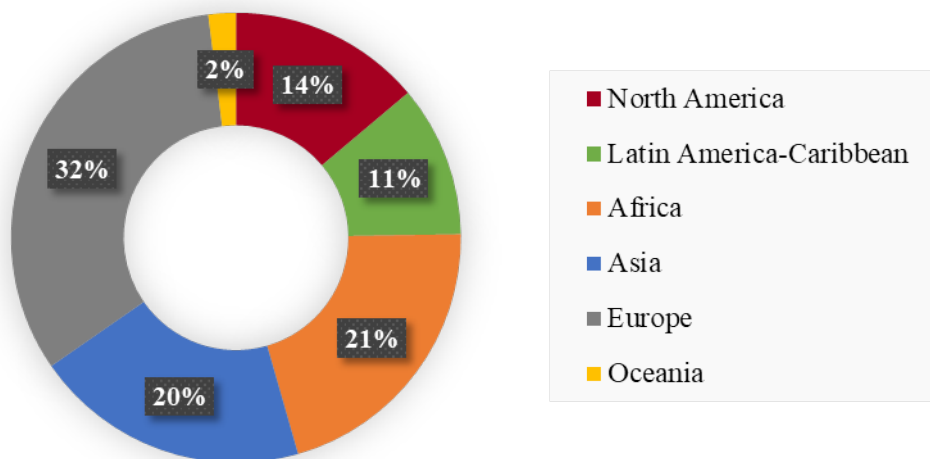Figure 2 - Percentage of experts by geographic region

Table 2 shows the classification of experts according to their position in their organisations. Almost half of the respondents are professors, while other groups with considerable number are researchers and private sector representatives and/or foundations focused on sustainable development.

Regarding the SDG indicated by each expert, there was no limit of goals that each one could indicate as their research area. For this reason, the experts could indicate one or more SDGs, according to their experience.

Table 2 – Number and percentage of experts according to their position

Position	Number of experts	Percentage of experts
Professor	128	48 %
Researcher	53	20 %
Foundation representative / Private sector	46	17 %
Student	18	7 %
University representative	19	7 %
NGO representative	2	1 %
Total	266	100 %

3. Results and Discussion

The survey results were analyzed in two different approaches: regional and global analysis, as presented in the following sections.

3.1 Regional analysis

Figure 3 allows an in-depth evaluation of SDGs research trends by region. The graphic of each region shows the number of experts who indicated each SDG as their research area and the percentage of experts by SDG, in relation to the total of the region. For example, in North America, according to Figure 3 (a), SDG 4 was chosen by 10 experts, representing approximately 27% of the total of 37 participants in this region.

In North America, it is observed that SDGs 11 and 13 were the most indicated by experts, with 35% and 41% of the total group of participants, respectively. Following come SDGs 15 and 4, with 30% and 27%. Therefore, in this region, the most prominent SDGs, according to the sample of experts, are those referring to *Sustainable Cities and Communities, Climate Action, Life on Land and Quality Education.*

In Latin America/Caribbean (b), the most chosen SDGs were also 11 and 13, with 50% and 39% of specialists, respectively, followed by SDG 4, with 29%. The SDG 14, about *Life Below Water*, received no expression of interest from experts in this region.

In Europe, according to Figure 3(c), the most addressed SDGs are 4, 11, 12 and 13, with 36%, 38%, 39% and 34%, respectively. These SDGs have been indicated by 30 or more experts, and address education, sustainable communities, *Responsible Consumption and Production*, and climate change.

Almost all six experts from Oceania (d) indicated SDG 13 (*Climate Action*), and half indicated SDGs 6 and 11 (*Clean Water and Sanitation* and *Sustainable Communities*). Many SDGs were not indicated as a focus of study by any of the experts, such as those related to poverty, hunger, gender equality, energy and inequality reduction.

In the African region (e), more than half of the specialists indicated SDG 13, further highlighted goals are SDG 1 (*Poverty Eradication*), 2 (*Zero Hunger*), 5 (*Gender Equality*), 6 (*Clean Water and Sanitation*) and 15 (*Life on Earth*), all indicated by more than 15 of the 55

experts from Africa. The goal with the lowest frequency of specialists was SDG 9, referring to *Industry, Innovation and Infrastructure*.

Figure 3 - Distribution of the experts according to their geographic region and chosen SDG

(a) North America

(b) Latin America/Caribbean

(c) Europe

(d) Oceania

(e) Africa

(f) Asia
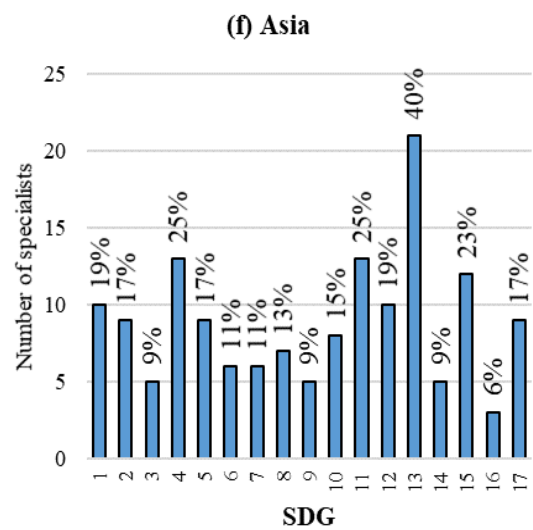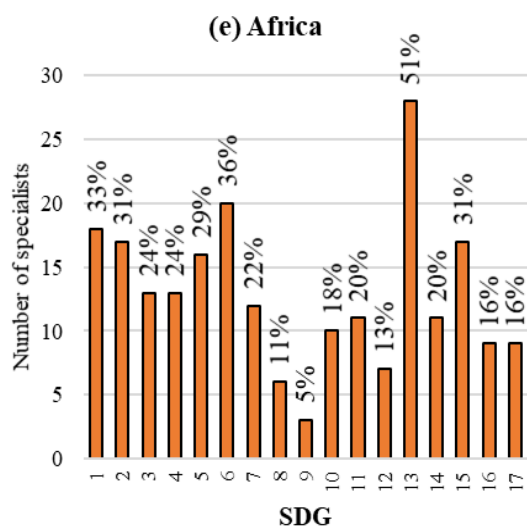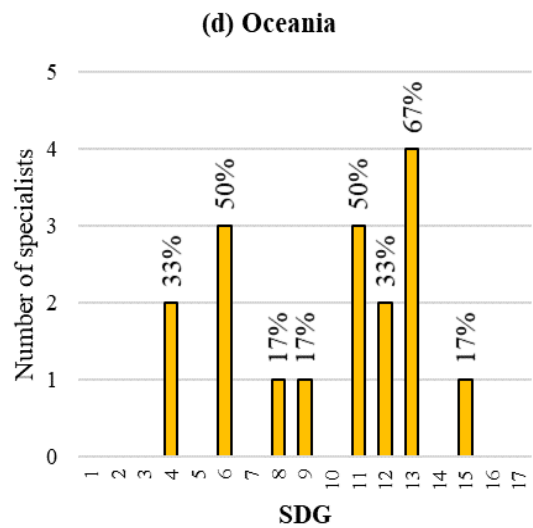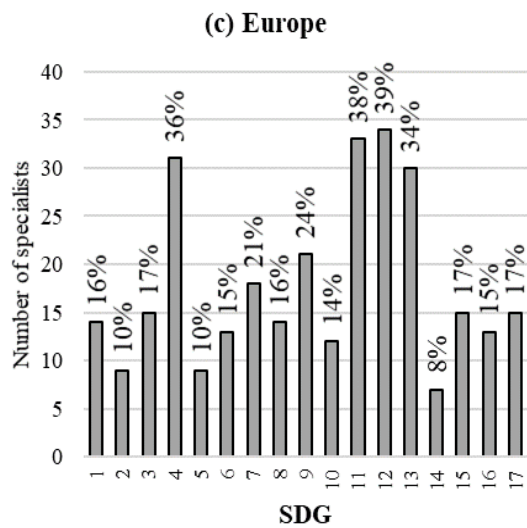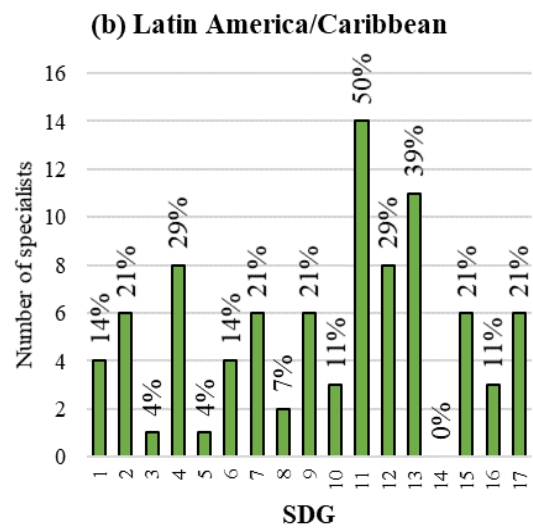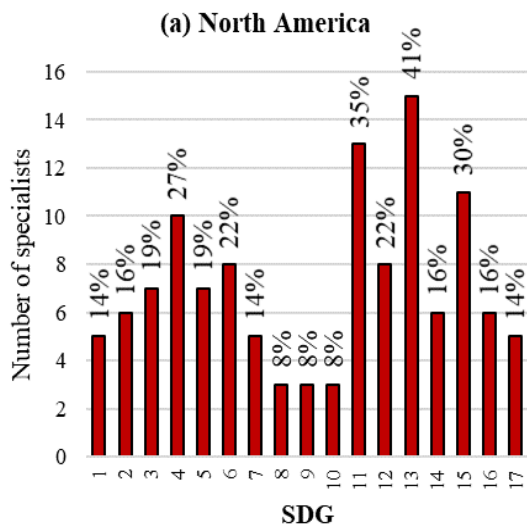
Finally, the Asian region (f), in which 40% of the experts chose the SDG 13, followed by SDGs 4, 11 and 15. The less indicated goal was SDG 16, which covers *Peace, Justice and Strong Institutions*.

Comparative analysis suggests Africa as the region with the highest percentage of experts focusing on SDGs 1, 2, 3, 5 and 10, which refer to *No Poverty*, *Zero Hunger*, *Good Health and Well-being*, *Gender Equality* and *Reduced Inequalities*. This behaviour was expected, to a certain extent, since the African region represents a worldwide concern regarding outstanding social issues. According to World Bank (2017), hunger and poverty are the most worrying factors in Africa, aggravated by rural exodus, high rates of population growth, and climate issues involving droughts in the region.

In the SDG Index & Dashboards report, rankings show the status of countries with regards to their compliance to the 2030 Agenda and SDG targets (Sachs et al., 2016). In SDGs indicators 1, 2, 3, 5 and 10, countries with the most critical situation in relation to achieving the targets come from Africa and Asia, which is in line with the results of this research, since these are related to the most worrying situations; it makes sense to be the ones that are currently receiving a greater focus of studies.

On the other hand, Europe stands out by focusing on SGDs 4, 9 and 12, related to *Quality Education*, *Industry*, *Innovation and Infrastructure*, and *Sustainable Consumption and Production*. Although many European countries are prominent in the world education rankings and many also have already met the SDG targets (Sachs et al., 2016; World Bank, 2017), access to quality education is considered essential for development, and therefore is the focus of continuous investment in Europe to maintain the standards observed. Education contributes to sustainable economic growth, enhances stability, and also relates to health, equality, peace and employment opportunities, and the European Parliament has repeatedly called for the continued allocation of its budget for investment in this sector (European Union, 2015).

As with education, SDG 9 also places European countries in good standings in the current rankings, in which the developed countries occupy the top positions; but Europe is still struggling behind countries such as South Korea, Japan and the United States, which is why it is in pursuit of this goal (European Union, 2016).

Regarding SDG 12, Europe has been improving since the year 2000, with an increase in productivity indicators and reduced internal materials consumption and waste generation (Eurostat, 2016). However, the decrease in the consumption of materials is not continuous, and fluctuates according to periods of crisis, and may be more a reflection of these than a transformation in patterns of consumption and production (European Union, 2016).

The SDG 11 is among the priorities of the experts in North America, Latin America/Caribbean and Europe. It seeks to make cities more inclusive, secure, resilient and sustainable, and therefore their approach connects with several other SDGs. Its justification lies in the fact that the urban population has been growing by 2% annually, and cities need to seek and offer innovation and sustainable development, mainly by promoting housing, transportation, quality air, public spaces and green areas (World Bank, 2017).

These topics explain the percentage of experts involved in this area, since surveys can range from urban planning to solid waste management and access to public transport (European Union, 2016; United Nations, 2016), which are thematic with many works and actions developed worldwide but require studies for local applications. The regions that have stood out in this SDG contain most developed countries or, in the case of Latin America/Caribbean, countries that do not face the same serious problems observed in many areas of Africa and Asia. Thus, these regions have a greater chance of investing in SDG 11, which, although important for all countries, may not be considered a priority for many,

especially those that still drastically suffer from other issues such as poverty, hunger and lack of water.

3.2 Global analysis

This section presents a summary in global perspective (Table 3), the total percentage of experts per SDG (Figure 5) and a final discussion relating the results with literature review.

Table 3 – SDGs most and least researched globally

SDGs most researched	4, 6, 11, 12, 13 and 15
SDGs least researched	1, 2, 3, 5, 7, 8, 9, 10, 14, 16 and 17

Figure 5 - Distribution of the total group of experts according to their chosen SDG
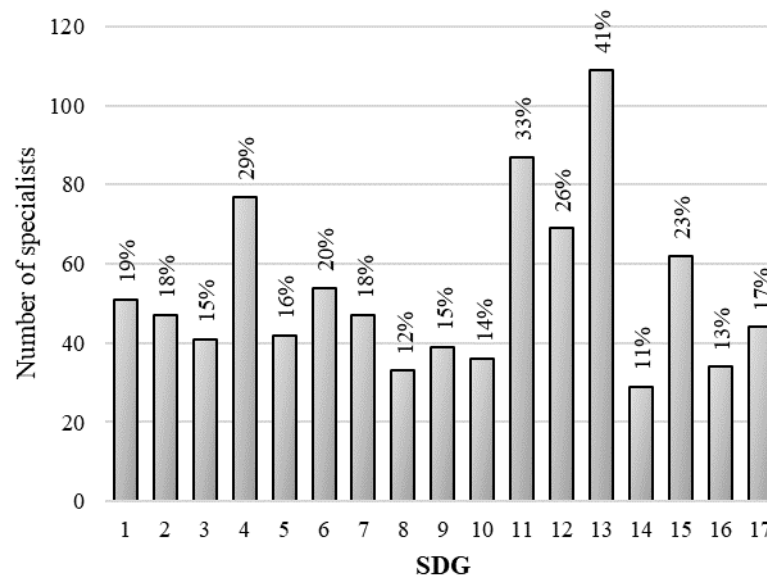
In summary, the study identified the fact that SDGs 8 (*Decent work and economic growth*), 14 (*Life below water*) and 16 (*Peace, Justice and Strong Institutions*) are proportionally less popular among the sample of researchers investigated. On the other hand, the most globally highlighted SDGs were 4 (*Quality Education*), 11 (*Sustainable Cities and Communities*) and 13 (*Climate Action*), as shown in Figure 5.

SDG 13 draws attention in all geographic regions and has more research dedicated to it globally. *Climate Action* is indeed an urgent matter and may have different effects depending on the region, but overall the trend is for global effects that can harm both developing and developed countries. This strong preference for SDG 13 is in line with the considerations of Verner et al. (2016), which address climate change as global challenges and priorities, that have been recognised as one of the greatest threats of the 21st century, encompassing themes such as energy, sustainable cities, resilient ecosystems, food security, among others.

As climate change already affects countries in all continents, through changes in weather seasons and patterns, extreme events and rising sea levels, SDG 13 addresses issues ranging from risks to agriculture, water supply, food production, ecosystems, to energy security and infrastructure (Chirambo, 2016; Prag, 2017; Reckien et al., 2014; World Bank, 2017), and this justifies the reason for having so many experts studying it in all geographic regions.

Another possible reason for such focus on SDG 13 is the research into alternative ways to contribute to the fight against climate change. The reduction of greenhouse gas emissions is fundamental and is indeed one of the indicators of the Goal, but there is a strong dependence on the economic and industrial issues of each country. For example, the European Union and Russia have reduced their emissions by 23% and 29% since the 1990s, respectively, by reducing energy consumption in several sectors, but other countries such as Australia, New Zealand, Canada, the United States and Japan increased their emissions in the same period (European Union, 2016).

Table 4 presents the final contribution of this study, by relating SDGs with great and less focus according to the research sample to the ones considered more challenging according to the literature review. That analysis highlights both the greater and lesser researched SDGs reflecting the challenging areas in each region. The ideal situation is one with the main challenges of each region being the SDGs with more researchers (SDG icon outlined being also green filled). On the contrary, outlined SDG icons with red fill represent negative situations, since they are challenging SDGs, but are not receiving much attention according to the sample researched.

The information presented in this paper contributes to the definition of possible gaps in SDGs research and identifies areas which could receive more attention in order to help meet the targets. Research is known as a tool to potentialize technological innovation, develop economy, promote social solutions and control environmental impacts, therefore highlighting the importance of knowing gaps and strengths.

As stated by other authors, how each country will implement the goals depends on political preferences, context-specific challenges and their own circumstances (Alleyne et al., 2015; Horn and Grugel, 2018). However, these identified gaps help understand how regions (and countries) should be involved with the SDGs and work towards progress, and especially how research could help in this sense.

According to Leal Filho et al. (2018c) and Caiado et al. (2018), research is among the pathways that lead to tangible results in meeting the goals in the medium and long term and it can help (especially) developing countries to overcome barriers seen in the transition to sustainability. Therefore, connecting research to challenging issues of each region can represent a starting point for putting actions into practice.

Table 4 – Relation between researched SDGs and the most challenges in each region

	North America	Latin America / Caribbean	Europe	Oceania	Africa	Asia
1 No Poverty						
2 Zero Hunger						
3 Good Health and Well-being						
4 Quality Education						
5 Gender Equality						
6 Clean Water and Sanitation						
7 Affordable and Clean Energy						
8 Decent Work and Economic Growth						
9 Industry, Innovation and Infrastructure						
10 Reduced Inequalities						
11 Sustainable Cities and Communities						
12 Responsible Consumption and Production						
13 Climate Action						
14 Life below Water						
15 Life on Land						
16 Peace, Justice and Strong Institutions						
17 Partnerships for the Goals						

Legend:
- SDGs with great focus according to the research sample
- SDGs with less focus according to the research sample
- More challenging SDGs according to the literature review

4. Conclusions

The SDGs offer a more detailed and realistic outlook of the broad and complex challenges that face the world in comparison to the MDGs. This might be one of the reasons they need to get more attention and more resources. It does not suffice to only define sustainability indicators (Lawn 2006), there is a need to identify ways to implement them.

This research has identified the fact that many SDGs are being addressed by experts around the world according to their experience and research area, pointing out emerging issues between these SDGs and the main local issues and challenges in each region.

The sampling for this research resulted in 266 participating experts from North America, Latin America/Caribbean, Africa, Asia, Europe and Oceania, with a large majority occupying the position of professor or researcher in their organizations. Whereas the rather small sample is a limitation and does not allow the results to be considered fully representative, the responses are robust enough to suggest that the sampled experts expressed a general preference for Goals 4, 11 and 13. Having said that, some specific trends were also observed, that is, some specific areas were given attention in specific regions. For instance, Africa stands out in the SDGs related to fighting hunger, poverty, reduction of inequalities, and improvement of water access and sanitation, which are themes recognized as challenges for this region. Europe, a region with countries that excel in economic and social development, presented a greater focus on SDG related to education, industry, innovation and infrastructure and sustainable consumption and production. In this case the approach to these goals may indicate the highest priorities of the European region, which already has good results in several goals of 2030Agenda, but which has a profile of investing in education and innovations to contribute to the general situation observed.

Climate Change, the focus of SDG 13, is highly researched in all geographic regions, which is justified by its global relevance, as well as its transdisciplinary approach, which can involve education and infrastructure, to water quality issues, food and agriculture and energy. Based on the sample used and approach given, it can be said that there is a relation between the local problems or challenges observed in some regions and the main areas of interest of the researched experts.

4.1 Implications for theory and practice

Nonetheless, the data gathered offers useful insights into the ways the SDGs are seen and perceived across an international audience. This knowledge is very useful in developing theory related to connections between challenges of each region, besides its gaps and strengths. It also allows a better understanding about the difficulties and potentials in pursuing and implementing the SDGs, especially among developing nations, where the need to implement them in practice is particularly acute. Further research is needed in various areas, for instance:

a) Studies on the implementation of specific SDGs in the geographical regions;
b) Comparative analyses of the problems hindering progresses in respect of the implementation of the SDGs
c) Research on the resources countries are making available vis-à-vis the implementation of the SDGs;

Finally, there is a need for a greater involvement of the academic community in respect of providing technical support to the implementation of the SDGs. In this context, the World Sustainable Development Research and Transfer Centre at the Hamburg University of

Applied Sciences in Germany is currently working on the production of the Encyclopedia of the Sustainable Development Goals, which will gather knowledge and information which will assist in the implementation of the SDGs in their widest sense.

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