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ICTs and the Localisation of the Sustainable Development Goals

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ABSTRACT

The United Nations Sustainable Development Goals (SDGs) are universally seen to be global in their nature and reach, but there is a growing acceptance that they have an important local dimension. At the same time, there is an increasing recognition of the need for appropriate information and communication technologies (ICTs) to support and monitor the SDGs. This article adopts a qualitative inductive research approach in examining a range of public authority and academic source material, and framework analysis is used to record, categorise, and critique this material. The findings provide an overview of the role of the SDGs at the local level and an assessment of how the localisation of the SDGs is being addressed in some urban areas within Western Europe. The findings also indicate how ICTs are being deployed to support the localisation process in Western Europe and the wider world. This is followed by a discussion of some emergent issues related to the localisation of the SDGs, including the increasingly important role of ICTs.

KEYWORDS

Developing World, ICTS, Information and Communication Technologies, Localisation, SDGS, Sustainable Development Goals, Western Europe

INTRODUCTION

Whilst much recent research on implementing the Sustainable Development Goals (SDGs) has focused on the role of the private sector (KPMG, 2018; Wynn & Jones, 2020), there is an increasing recognition that action at the local authority level will be vitally important in building sustainable communities and addressing the environmental, social and economic challenges posed by the SDGs. United Cities and Local Government (2018, p.2) argued, "All of the SDGs have targets that are directly or indirectly related to the daily work of local and regional governments. Local governments should not be seen as mere implementers of the agenda. Local governments are policy makers, catalysts of change and the level of government best-placed to link the global goals with local communities." The European Commission (2018, p.1) reported that "many municipalities throughout Europe and globally are raising awareness about the SDGs and are looking for ways to integrate the SDGs into their policy plans." Indeed, unlike the predecessor, the Millennium Development Goals, which only

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applied to the developing world, the SDGs are also applicable to countries in the developed world. As such, this is a formal recognition that people and communities within the developed countries also face a variety of environmental and social problems, and it offers an opportunity for such countries to reflect on the state of their societies.

At the same time, there is an increasing recognition of the need for appropriate information and communication technologies (ICTs) to support and monitor the SDGs. The International Telecommunications Union (2018, webpage), for example, claimed, "ICTs can help to accelerate progress towards every single one of the 17 UN SDGS." This resonates with Huawei's (2018) claims that ICTs will be key accelerators that will increase the scale and diffusion of SDG solutions, and that the access, connectivity and efficiency offered by ICTs will be essential catalysts for achieving the SDGs.

Leal Filho et al. (2017) suggested that the "fact that the United Nations and its member countries have committed to attaining the SDGs by 2030 has added a sense of urgency to the need to perform quality research on sustainable development on the one hand and reiterates the need to use the results of this research on the other" (p.1). This exploratory article attempts to address the current absence of studies in the extant literature regarding how the SDGs are being implemented at local level, and the role ICTs are playing in that process. This introductory section is followed by an outline of the research methodology and the central research questions. Section three discusses relevant background material concerning SDGs at the local level, and sections four and five then address the two research questions. A wider discussion of related issues that emerged in the framework analysis ensues, and the concluding section then draws together the main findings presented in the article and offers some final reflections.

RESEARCH METHODOLOGY

The research methodology was based on an inductive, qualitative approach, focusing on an extensive review of existing academic literature and local authority and public sector reports. This adopted some of the principles and procedures of a bibliometric review (de-Miguel-Molina et al., 2015), which can be seen as a method broadly used "to draw the big picture in a literature review" (p.1). It starts with the definition of basic questions to be answered in the literature review (Börner & Polley, 2014). In the context of this research, these included the following questions:

Where, in Western Europe, are local authorities specifically addressing the SDGs, and which SDGs are being implemented?

Which technologies are being deployed to support the localisation of SDGs?

What differences are there in the use of ICTs between developed and developing world environments as regards the SDGs?

The authors conducted a range of Internet searches in the period January to October 2019, using Google and Google Scholar search engines. This provided an initial assessment of the key issues. Building on the initial findings, two central research questions (RQs) were then formulated which are addressed in this article:

RQ1: How are the SDGs being implemented in urban areas within Western Europe?
RQ2: How are ICTs being deployed to support localisation, within Europe and the wider world?

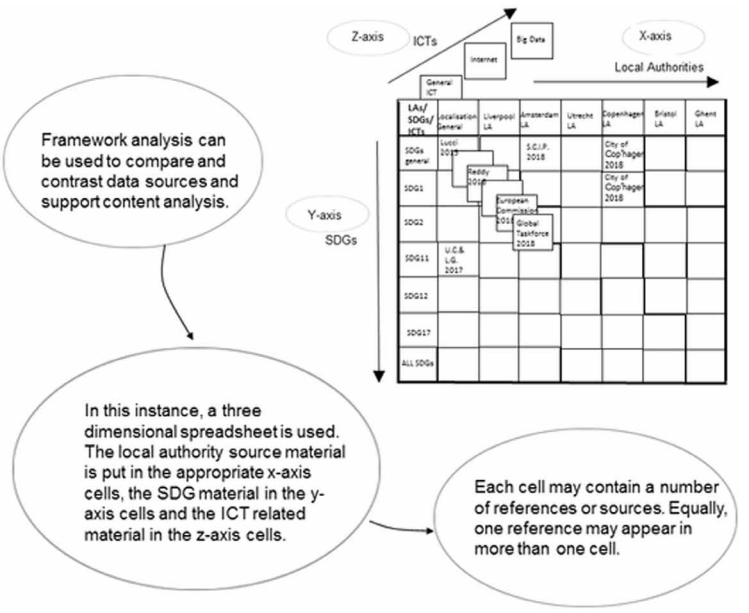
Once appropriate material was located, framework analysis (Mason et al., 2018) was then used to identify key themes for assessment and discussion in specific local authority contexts and environments. This technique has been successfully deployed for qualitative analysis in a number of areas, including research into technology transfer (Wynn, 2018) and the SDGs and industry sectors (Wynn & Jones, 2020). It is a simple technique that aids the researcher in organising and reviewing source material. As Walsham (1995) has observed "it is desirable in interpretive studies to preserve a considerable degree of openness to the field data, and a willingness to modify initial assumptions and theories. This results in an iterative process of data collection and analysis, with initial theories being expanded, revised, or abandoned altogether" (p.76).

In this instance, five main elements were initially identified for assessment in the framework: specific SDGs; specific local authorities; specific technologies; localisation commentary; and the internet and document source material itself. After experimentation with a number of possibilities, a three dimensional spreadsheet was used as the framework. Along the x (horizontal) axis, specific local authorities and localisation commentary were entered; along the y (vertical) axis, specific SDG data sources were entered; along the third dimension – the z-axis – different technology reference material was entered; the internet and document source references were recorded in the appropriate cells, often with more than one reference in each cell (Figure 1).

SDGS AT THE LOCAL LEVEL

Lucci (2015) argued that localising the SDGs "is most commonly understood as the role of local governments in implementing the goals" but that the term "could also refer to monitoring progress on the goals at sub-national level" (p.2). The Global Taskforce of Local and Regional Governments (2018, webpage) captured both interpretations in defining localization as "the process of defining, implementing and monitoring strategies at the local level for achieving global, national and sub-national sustainable development goals and targets."

Figure 1. Use of framework analysis to store, compare and analyse data sources



In addressing the role of local governments in implementing the SDGs, Reddy (2016) claimed "it is a fact that many of the sustainable development goals that have been identified will impact on the role and responsibilities of local government, namely poverty reduction; access to water and sanitation: health and education; economic growth; development of cities and human settlements; and resilience to climate change" (p.1). In answering the question "why does localizing matter?", the Global Task Force for Local and Regional Government (2018, webpage) argued "while the SDGs are global, their achievement will depend on our ability to make them a reality in our towns and cities" and that "the achievement of the SDGs depends, more than ever, on the ability of local and regional governments to promote integrated, inclusive and sustainable territorial development." Further, Reddy (2016) argued "there is a growing awareness, recognition and acknowledgement by the international development community and national governments that the local sphere of government is in the best position to facilitate the mobilisation of local development stakeholders" (p.4).

In a similar vein, the European Commission (2018) suggested that "local and regional authorities play an important role in implementing the Agenda 2030 and…..all SDGs and targets" (p.1). The European Commission (2018) also claimed, "Local and regional authorities, as well as local civil society, are closest to EU citizens, and are therefore in a position to develop 21st-century service models in line with emerging needs in their communities" (p.2). United Cities and Local Government (2017) argued that local governments have a role to play in contributing to all 17 SDGs, outlined why each of the SDGs "matter to local governments" (p.3) and itemised the relevant targets for each SDG.

In some ways, SDG11, seen to be concerned with "putting cities at the heart of sustainable development in an urbanizing world" (United Cities and Local Government, 2017, p.13), provides a particularly sharp focus for local governments looking to contribute to the SDGs. Here, United Cities and Local Governments (2017) argued "SDG11 marks a major step forward in the recognition of the transformative power of urbanization for development, and the role of city leaders in driving global change from the bottom up" (p.2). More specifically, United Cities and Local Government (2017) suggested that urban local authorities have important responsibilities in promoting the use of public transport, in helping to reduce carbon dioxide emissions, in developing waste management strategies that emphasise reuse and recycling and to help to mitigate the effects of climate change.

The United Nations is working to address the issues of perceived data requirements and standardization of metrics to monitor progress in achieving the SDGs and has produced a list of resources deemed to be helpful for domestication and nationalization of the SDGs (United Nations Environment Programme, 2019), but little work, specifically designed for the local level, has yet been published. However, UN Habitat (2016) has developed a monitoring framework designed to assist national and local governments to monitor and report on SDG11 (Sustainable Cities and Communities) which, in theory, seems appropriate to the localisation agenda. This framework stressed the need to disaggregate information but recognised that disaggregation is expensive and requires appropriate ICT and co-operation between national and local government.

LOCALISING THE SDGS WITHIN WESTERN EUROPE

The Global Task Force of Local and Regional Governments (2018) mapped out the global geography of the localisation of the SDGs and reported that local and regional governments were pursuing SDGs in over 60 countries across all continents. Within Europe, the Global Task Force of Local and Regional Governments (2018, webpage) suggested that governments had been "more active" in pursuing the development of SDGs "in Northern and Western Europe" than in "East and South-East Europe" but that "many networks are implementing initiatives to support the localization process."

Within Western Europe, initiatives to localise the SDGs are underway in a number of cities. In the Netherlands, for example, the Social Challenges Innovation Platform (2018) reported that the City of Amsterdam is looking for initiatives to raise awareness and translate them into action at the

local level. Here the focus is initially on raising awareness of both the programme of SDGs and on specific SDGs, and the target group is citizens, especially those who might be unaware of the SDGs, and on initiatives that focus on different neighbourhoods. Further, the Social Challenges Innovation Platform (2018, webpage) suggested that "the city is specifically interested in initiatives that focus on diversity and inclusion, that make use of technology as an example to reach a bigger audience, link actors that are less likely to work together on the global goals and/or that have an innovative business model." More specifically, the focus is on initiatives that educate and engage the city's population, that look to build in self-sufficiency and continuity and to leverage technology and social media.

Utrecht City Council (2018) "has adopted the SDGs as a guiding framework to orient the city's development, as well as with its cooperation with other cities, to be sustainable and inclusive" and the "municipalities are to increase awareness of the SDGs amongst Utrecht's residents and businesses, and to stimulate them to take supportive and (where possible) cross-sectional action" (p.2). This framework has two main objectives, namely "to create and support coalitions with local actors… to address international sustainable development challenges" and "to convene and support local stakeholders …to raise awareness and inspire action at the local level" (p.5). Further, the Council argued that its policy on "Healthy Urban Living" (p.8) offered an important focus for the SDGs, and provided a number of specific examples of its achievements in partnering with local businesses and connecting their products and services to the SDGs

The City of Copenhagen (2018) has produced an "Action Plan for the Sustainable Development Goals" (p.1). In welcoming the SDGs, the City of Copenhagen reported that it wished to go beyond the Danish Governments' national action plan for the SDGs by "using the SDGs as an opportunity to raise the bar and expand on both new and existing sustainability initiatives, making the city an even better place to live and work" (p.7). The City of Copenhagen (2018) reported that it would link its "living labs" (p.9) - namely the urban locations where innovative solutions based on the city's traffic and public health waste, for example, are devised in dialogue with residents and companies - and also emphasised its commitment to set goals for each of the SDGs. In addressing SDG1 at the city level, a number of targets - for example, fewer children growing up in poverty and fewer homeless residents - were set, a number of initiatives were identified, and a number of selected measures were specified. In addressing climate action, the targets included the city accommodating 30% more rainfall in 100 years and improving its ability to handle more regular cloudbursts and storm surges.

Within the UK, it has been argued, "with the exception of a handful of SDG initiatives driven by local stakeholders, there appears to be little on-the-ground activity in UK cities around this agenda" (Diprose & Taylor-Buck, 2018, webpage). Nevertheless, a variety of SDG initiatives can be identified. The Greater London Authority (2019) reported on working with young Londoners to understand their priorities and concerns and how they relate to the SDGs, and on looking to develop a vision for London, which is informed by the SDGs and the views of young Londoners. On a smaller scale within London, the City of London Corporation (2018, webpage) announced plans in 2018 to establish the "City Corporation's Sustainable Development Capital Initiative", which will work to develop London as a leading hub for development finance, with the aim of helping to raise the necessary capital required to help meet the SDGs. The UK's first local 2030 Hub was established in Liverpool and here the objectives are "to raise awareness of the SDG framework and share how it adds value to cities, businesses, social sectors and individuals" while "also facilitating additional local impact against the 17 goals, 169 targets and 230 indicators" (2030hub, 2018, webpage).

The Bristol SDG Alliance came into being following meetings of local activists, campaigners and academics in 2016. Its aims are "to drive Bristol's long-term sustainability and resilience; to monitor progress and enable the region to hold itself to account; and to connect community and city-level action to national and global challenges" (Bristol Green Capital Partnership and the University of Bristol, 2018, p.9). More practically, the Alliance was "developed to facilitate on the ground action on the SDGs" and has been involved in "creating and assisting in several initiatives" (p.11). These

include fostering the integration of the SDGs into the One City Plan, an ambitious collaborative approach to reach a shared vision for Bristol, and more generally into the work of Bristol City Council, developing research links with Bristol University and running a Festival of the Future City in 2017.

In many parts of the UK, voluntary organisations are also involved in organising food banks, in providing food and temporary shelter for the homeless and those sleeping on the streets, and in helping to run a variety of local community food production programmes. The Greater Manchester Poverty Action Group, for example, works to address poverty across the city region. More specifically the Group looks to raise awareness of poverty and its effects and causes, to connect people and projects for anti-poverty collaboration, to help to strengthen the voices of people in poverty and to directly influence policy and practice that will help to reduce poverty. The ultimate goal of the Food Poverty Action Plan for Greater Manchester, launched in 2018 and co-ordinated by the Group, is that all support activities should be "geared towards prevention of food poverty, by helping people to find their way out of poverty" (Skinner, 2018, p.6).

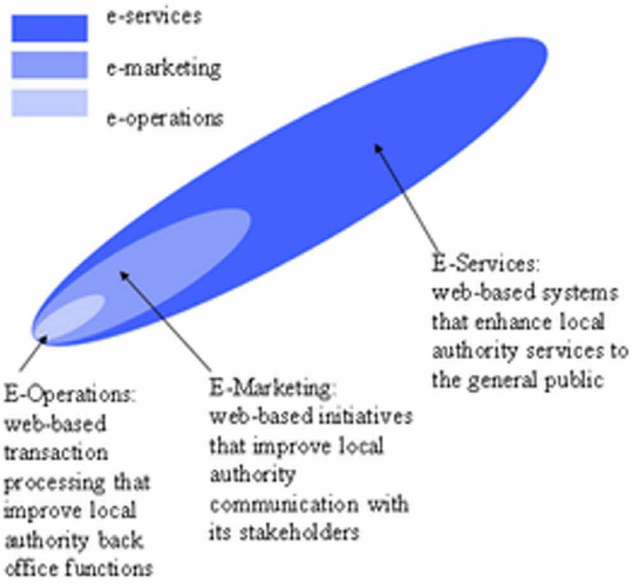
THE ROLE OF ICTS IN PROGRESSING THE SDGS AT LOCAL LEVEL

In charting out a "Roadmap for Localizing the SDGs", the Global Taskforce of Local and Regional Governments (2018, webpage) identified five steps, namely, "awareness raising", "advocacy", implementation, "monitoring" and "where do we go from here" in their "Roadmap for Localizing the SDGs", and ICT has an important role to play in contributing to all five steps. More generally, the International Telecommunications Union (ITU) (2018, webpage) suggested that "ICTs can accelerate progress towards every single one of the SDGs" and that "central to ITU's strategy to leverage the power of ICTs to accelerate progress on the SDGs is the 'four I's' framework based on building Infrastructure, securing Investment, promoting Innovation and ensuring Inclusivity." Whilst the new "disruptive" technologies can be of relevance in this context, the more essential building blocks of ICT provision that the ITU refer to above ("building infrastructure") are the key to facilitating localisation of the SDGs.

Access to the internet, availability of networked servers with useable database products, broadband connectivity, email, website design packages and office productivity tools – products and services that have been around for 20 years or more – are vital for the implementation and monitoring of the SDGs at local level - yet these are all too often not readily available, particularly in developing world environments. The importance of these technologies to support basic e-Government functions that underpin localisation has been emphasised in a number of studies in developing world contexts. For example, Forti and Wynn (2017), in their research of local administrations in Libya, found that the absence of basic IT infrastructure was a major limiting factor in local government functions. Only once this basic ICT infrastructure is in place, do the newer technologies – for example big data, analytics, artificial intelligence, cloud computing, knowledge management and the Internet of Things – become relevant, and these may then play a role in delivery of the SDGs at local and regional levels. Local and regional administrations need to be "ICT-ready" (Ericsson & the Earth Institute Columbia University, 2016, p.5) to support the localisation of the SDGs. As an example, Baporikar (2017), in an Indian public sector context, has shown how knowledge management can then be exploited to improve policy development and related operations. Other studies (Olakunle et al., 2016), have illustrated how reliable power supply and internet access are critical capabilities in supporting local initiatives in both the private and public sectors in developing world environments. Here, Feeney's (2001) model of the domains of e-business is still of relevance today in a local authority context (Figure 2). Reliable internet connectivity and web enablement are key enablers of improved local authority operations and services in the developing world.

The need for email, simple databases and social media is evident in step one of the Roadmap referred to above - "awareness-raising (getting to know the SDGs at subnational level)." To achieve this, the Global Taskforce for Local and Regional Governments (2018, webpage) suggest a range of

Figure 2. The three domains of e-opportunity for local authorities (based on Feeney, 2001)



measures that local and regional governments should pursue, such as "carry out awareness-raising and communication campaigns" and "reach out to all sectors of society though traditional and social media." Similarly, the Global Taskforce for Local and Regional Governments (2018, webpage) suggested that related associations and networks "carry out national and international campaigns to increase the commitment of local and regional governments to the SDGs." For step two "advocacy (including a subnational perspective in national SDG strategies)", a similar mix of basic ICTs will be needed to "gather evidence from different stakeholders to support the advocacy messages of local and regional governments." For step three "implementation (who can do what)", it is suggested local and regional governments "identify needs by analysing existing plans and programmes", and that associations and networks "promote the exchange of best practices among their members." In step four – "monitoring (evaluating and learning from our experiences)", local and regional governments are asked to "collect, monitor and analysing data at subnational level" and to "promote the participation of other stakeholders and ensure that the information gathered at local level is used in national SDG monitoring and reporting." For step five "where do we go from here?", the Global Taskforce for Local and Regional Governments (2018, webpage) assert that "it is essential that the awareness-raising, advocacy, implementation and monitoring of the SDGs at local level, particularly for SDG11 on Sustainable Cities and Human Settlements, is linked up with the New Urban Agenda adopted at Habitat III." To be effective, all these activities require access to basic ICT tools, systems and networks.

In Europe, there are a number of examples of how these technologies have facilitated SDG related initiatives at the local level. For example, in Belgium, the city of Ghent developed a plan of communication for actions on the SDGs that they had to focus on, in the "SDG Voices" project, where they "made a clever media-campaign with movies and a website to appeal to citizens" (ESDN, 2017, p.3). Galli et al. (2018) reported on the localisation of SDGs at regional and local levels in Montenegro via the "mapping and content analysis for multiple indicators (SDG, national, international and proposed composite indicators)" allowing the "analysis of needs, importance, and main challenges of an integrated monitoring framework." This requires sound supporting technologies including PC based analytical software such as NVivo and SPSS. They note, "Different indicators can play different roles in either guiding policy decisions and/or communicating the attainment of

sustainable development in Montenegro" (p.160). Another key issue here is that the technology is, in the main, a supporting, facilitating element, and other factors relating to process and procedures and people skills and capabilities are of equal importance.

Amsterdam, as noted above, is keen to use social media and supporting technologies in its SDG localisation programme, and now has an SDG "Impact Hub" which "provides a continuous engagement opportunity to accelerate solutions per SDG and develop shared knowledge and resources. It is also an accessible collaboration platform for established organisations, impact entrepreneurs, SMEs, institutions and independent professionals who want to learn about and work on the SDGs in an entrepreneurial way" (Meetup, 2019, webpage). The Hub is supported by an interactive website for information dissemination and feedback. Over and above this, some of the more specific newer technologies can be of value in certain contexts. For example, using analytics software, Utrecht City Council (2018) has developed a "Global Goals Dashboard" (p.2), designed to present data about the SDGs in a user-friendly manner. On the one hand, the dashboard provides municipal employees with a clear view of how the SDGs relate to their work and helps to facilitate new methods of working between municipal departments. On the other hand, it provides an accessible, transparent and interactive tool, which motivates a range of the city's stakeholders and keeps them informed about the city's progress in contributing to the SDGs.

More generally, in a developing world context, ICT companies, industry bodies and academics have all emphasised the significance of mobile technology in the implementation of the SDGs at country, regional and local levels. Ericsson and the Earth Institute Columbia University (2016), for example, see this as "connecting the unconnected" (p.24), and the ICT industry body GSMA (2016) stressed the importance of "extending network coverage to rural areas" but arguably more importantly recognised that, while connectivity "is a very important first step", the real prize is about "what this connectivity enables" (p.5). In this context, the World Economic Forum (2018, webpage) reported that, regarding SDG2 (Zero hunger), almost 150 million people living in rural areas in developing countries have started using mobile technology since 2015. The report cites the Living Goods project in Uganda, "where community health workers use apps to register members of a household and record relevant health information. This initiative has shifted behaviours in a country where poor nutrition is a key factor in child mortality and 29% of children under five years old suffer stunted development. For new mothers using the service, there was a 32 percentage-point improvement in the number of women successfully initiating breastfeeding compared to non-users."

Once the basic ICT infrastructure is in place, the availability and diffusion of data is also significant in the regional and local implementation of the SDGs. ElMassah and Mohieldin (2018), for example, draw on country case studies from Cambodia, Colombia, Egypt, Ghana, Kenya, the Philippines, Tunisia and India, to suggest that "the use of Big Data is crucial to link the concept of localization with the effective implementation of the Sustainable Development Goals" (p.1). They add that "technological and Big Data solutions can provide governments with effective tools to localize sustainable development (SD) by diffusing ownership of the SDGs to promote better service delivery, thereby localizing the SDGs" (p.2).

DISCUSSION

Attempts to address the SDGs at a local level face a range of challenges. These challenges are most acute in less developed countries, but there are also many challenges in looking to localise the SDGs in developed countries, and a number of issues merit reflection and discussion.

First, there are issues about the complexity and interdependence of the SDGs. Fu et al. (2019), for example, suggested that "there is an urgent need for a holistic approach to clarify the interrelationships between the 17 SDGs" and argued that "the situation has made it impossible for policy makers to recommend ways in which to holistically achieve the full set of SDGs" (p.386). In a similar vein, Weitz et al. (2018) argued, "how the sustainable development goals interact with each other has

emerged as a key question" which has "potentially strong implications for prioritization" (p.531). The authors' work in Sweden suggested that "the SDGs are dominantly mutually supportive" but that "responsibility for the policy areas of individual targets…. belongs to different ministries" and this in turn "suggests that bridges for collaboration are needed between ministries" (p.543).

Second, the localisation of the SDGs is still very much in its infancy, and in the UK, for example, there is little by way of policy guidance as to how the process is to be supported and facilitated. In outlining its approach to delivering the SDGs, the UK Government (GOV.UK, 2017) made outline mention of some of the ways in which local authorities, and businesses, were working, to contribute to a number of the SDGs. This work was seen to embrace a number of issues including working with families and schools to promote healthy and balanced diets and giving local authorities £6 billion for highways maintenance. At the same time, the House of Commons International Development Committee (2017, webpage) welcomed the Local Government Association's engagement with the SDGs and expressed its hope that the Local Government Association will "encourage all UK local authorities to engage with the SDGs and incorporate them into their work, to support domestic achievement of the Goals."

More generally, Local 2030 (2018, webpage) argued "to happen locally, Agenda 2030 needs to be sufficiently funded" and that "localizing finance means not only to assign funds for the local level, but also to create the enabling space for economic development at local level." In a similar vein, the Global Taskforce of Local and Regional Governments (2018, webpage) suggested, "One of the main challenges for localizing the goals remains addressing subnational governments' access to finance."

At the same time, the Sustainable Development Solutions Network (2016, webpage) argued, "Local governments engaged in SDG localization need to mobilise innovative funding mechanisms and to incorporate financial planning as an integral aspect of all action plans." Further, the Sustainable Development Solutions Network (2016, webpage) advised, "Financial planning for the SDGs should be based on a comprehensive needs assessment." Such assessments "will not only need to account for capital interventions" but also to take into account "the costs of operations and maintenance, depreciation, capacity development, cooperation and coordination mechanisms, monitoring systems and the additional operating and marginal costs for attaining universal coverage of services and systems." Such a prescription currently seems a tall order for local authorities in the UK, but the Transition Network (2019), a community-based initiative which looks to respect natural resources and to create resilience and to promote inclusivity and social justice, offers some valuable and practical pointers. Nevertheless, Osieyo (2019, webpage) argued, "A crucial discussion has been missed on how central government can facilitate an enabling environment to make the Goals responsive to local issues."

Third, there are issues about measurement and metrics. At one level, there are issues about the data that is required to measure progress, the collection of such data and the mechanisms and procedures that will need to be established in order to monitor progress. At the local level, for example, Sultana (2018) argued "local data are often not collected, or are not collected properly, are frequently inaccurate and are expensive to collect" (p.188). More generally, the dominant approach to the measurement and monitoring of the SDGs is to identify indicators for each SDG, but Bali Swain (2018, webpage) argued, "This approach, if not flawed, is inadequate" not least, in that it ignores the complex interrelationships between some of the SDGs. At the same time, the UN Division for Sustainable Development Goals (2018, webpage) acknowledged "many important issues, such as gender equality, health, sustainable consumption and production, and nutrition, cut across goals and targets. The goals and targets are themselves interdependent, and must be pursued together, since progress in one area often depends on progress in other areas."

More critically, Liverman (2018) claimed that "the expansion in the number of goals and targets, especially as indicators are developed for measuring progress towards targets, will add even more calculation, monitoring and quantification to the process of evaluating development" and that "this is evident in the many calls to take advantage of new technologies for creating social and environmental

indicators." This in turn led her to claim "this can result in overly narrow assessments that direct policy towards quantifiable outcomes rather than broader but harder to measure social needs" (p.178). Further, Nightingale (2018) suggested, "for the SDGs to be effective, they need to go beyond simple statistics to account for how situated, performative aspects of life evolve, rather than as they are" (p.196).

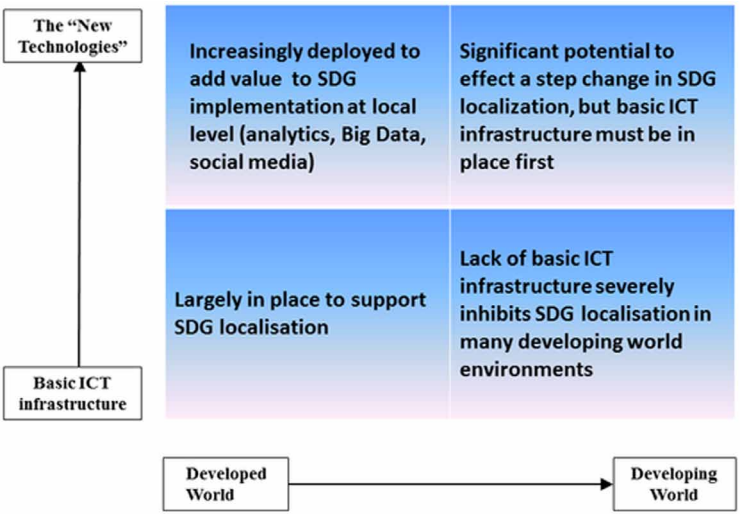
Fourth, the role of ICTs in the localisation of SDGs will vary in different socio-economic environments, but will become of increasing relevance. In Western Europe, SDG localisation initiatives are about "informing", "exchanging", "communicating", "monitoring", "reporting" and "analysing" a range of facts, figures and indicators. This requires the availability of what is now seen as basic ICT infrastructure, plus an adequate level of skills and capabilities of those personnel involved. Here then, ICTs are in the main facilitating and supporting tools in environments where there is often, but not always, an established and mature tradition of ICT deployment. In the developing world, however, ICTs may have a more significant role in the local deployment of the SDGs. Heeks (2016) notes that the scope, reach and depth of ICTs in developing countries is changing apace and he foresees the emergence, prior to 2030, of a "digital development paradigm in which ICTs are no longer just tools to enable particular aspects of development, but the platform that mediates development" (p.1). ICTs are already having a major impact on how local administrations operate in many developing countries and these can now significantly enhance the capabilities of local and regional governments to address the SDGs. Here then, ICTs can support a step-change in the localisation of SDGs, playing a lead, rather than, supporting role. Ericsson and the Earth Institute Columbia University (2016) note that in this context "ICT has immense potential …. helping low-income countries to leapfrog to achieve key development milestones while contributing to a growth economy" (p.9).

It could be argued that developing world local government administrations may be able to leapfrog technology platforms and building blocks, which - in terms of Zuboff's classic model of the role of information technology in organisations (Zuboff, 1989) - would mean going straight to the "transformate" stage, without going through the "automate" and "informate" stages. Indeed, a UN meeting of experts looking into "E-government for Sustainable Development" (United Nations Department of Economic and Social Affairs, 2017) recommended the following topics for further research: (i) artificial intelligence, (ii) internet of things, (iii) open, virtual, and cloud-based architectures, (iv) big data and analytics, (v) smart platforms, (vi) social and mobile technologies. However, the basic computer infrastructure needs to be in place to support the effective deployment of these "new technologies" and even the core e-business technologies. Web enablement of local authorities, for example, can bring about rapid and significant change in e-government capabilities and thereby local implementation of the SDGs, once the basic network infrastructure and hardware devices are in place (Figure 3).

It is encouraging that a UN survey (United Nations, 2016) found that more governments are embracing ICTs to deliver services and to engage people in decision-making processes in all regions of the world, and provided new evidence that e-government has the potential to help support the implementation of the 2030 Agenda and its 17 SDGs. It also reported, however, that disparities remain within and among countries. Lack of access to technology, poverty and inequality prevent people from fully taking advantage of the potential of ICTs and e-government for sustainable development.

Fifth, there are social issues related to distributional equity and the implementation of the SDGs at local level. While commitments to sustainability usually have a strong environmental focus, much less attention has been paid to the social dimension. It is often argued that the SDGs will bring socio-economic benefits to local communities, in terms of the creation of new employment opportunities associated with, for example, the establishment of new waste management and recycling facilities. However, issues may arise in terms of the quality of such opportunities, the reward levels associated with them, and the geographical distribution of such benefits at local and regional levels. The impact on social and intergenerational equity, seen to be fundamental to SDGs, may prove a complex and testing set of issues at local level in both developed and developing world contexts.

Figure 3. Impact of ICTs in the localisation of the SDGs



CONCLUSION

In addressing the research questions noted above, this exploratory paper has provided a number of illustrations of how the SDGs are being localised in some urban areas within Western Europe, and has outlined how ICTs are being employed to support these localisation processes in a wider context. While a number of interesting local initiatives and supporting ICT developments were identified, the localisation of the SDGs is still in its infancy. Nevertheless, it is evident that local administrations have a vital role to play in implementing the SDGs. This is supported by the Global Task Force of Regional and Local Government (2018, website), who reported, "The achievement of the Sustainable Development Goals depends on their full ownership by our communities, cities and regions. Local and regional governments around the world are also convinced that they have a key role to play in triggering that ownership, and an important responsibility in fostering implementation by integrating the various agendas on the ground and ensuring territorial cohesion."

Looking to the future, work on the localisation of the SDGs can contribute to, and underpin, sustainability research both empirically and theoretically. At the macro scale, the complexity of the SDGs, and the interactions between them, may seem to make empirical research intractable. However, at the local level, empirical research into the pursuit of the SDGs might be seen to offer more easily defined and more manageable research problems and questions, and enable researchers to monitor the effects of interventions more closely. Although framing investigations to investigate the effectiveness of SDG initiatives at the local level may not be straightforward, such studies may offer a way forward, particularly for lone researchers and small research teams, in making a contribution to the growing body of knowledge about the effectiveness of projects designed to contribute to the SDGs, and how ICTs can most effectively support this process in both developed and developing world environments.

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