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Opinion Paper

From fighting COVID-19 pandemic to tackling sustainable development goals: An opportunity for responsible information systems research

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ABSTRACT

The recent outbreak of the COVID-19 pandemic has posed a significant threat to the healthy lives and well-being of billions of people worldwide. As the world begins to open up from lockdowns and enters an unprecedented state of vulnerability, or what many have called "the new normal", it makes sense to reflect on what we have learned, revisit our fundamental assumptions, and start charting the way forward to contribute to building a sustainable world. In this essay, we argue that despite its significant damage to human lives and livelihoods, the coronavirus pandemic presents an excellent opportunity for the human family to act in solidarity and turn this crisis into an impetus to achieve the United Nation's (UN) Sustainable Development Goals (SDG). In this article, we will highlight the six relevant themes that have evolved during the pandemic and the corresponding topics that future researchers could focus on. We conclude by issuing a call for more research attention on tackling SDG through developing the concept and practice of digital sustainability.

1. Introduction

The outbreak of the novel coronavirus-caused infectious disease (COVID-19) has posed a severe threat to the healthy lives and well-being of millions of people around the world. On March 11, 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a global pandemic. By June 22, COVID-19 had affected 213 countries, with more than 9,000,000 confirmed cases and more than 470,000 reported deaths globally. As this global pandemic shares the facets of complexity, uncertainty, and evaluativity that characterise grand challenges, overcoming such a global pandemic will require concerted and sustained contributions from various disciplines worldwide (George, Howard-Grenville, Joshi, & Tihanyi, 2016; Gümüsay & Haack, 2020).

Undoubtedly, the COVID-19 pandemic has changed many aspects of our lives, especially in IS-related areas such as information behaviour, business models, cybersecurity, and data privacy (Davison, 2020). One opportunity for IS scholars to contribute to this ongoing effort is to build on the collective knowledge being created as we continue to combat the COVID-19 pandemic, and respond swiftly to develop new research expertise in tackling grand challenges through responsible Information Systems (IS) research. Generally speaking, responsible IS research aims to contribute to our understanding of how IS makes the world a better place (Davison, Hardin, Majchrzak, & Ravishankar, 2019). Previous responsible IS studies have demonstrated the beneficial impacts of ICTs in dealing with grand challenges such as global health, poverty alleviation, climate change, humanitarian crises, and natural disasters (Braa, Monteiro, & Sahay, 2004; Heeks & Arun, 2010; Rajão & Hayes, 2009; Tim, Pan, Ractham, & Kaewkitipong, 2017; Tusiime & Byrne, 2011). Hence, we suggest that there are areas in which responsible IS research can provide knowledge that might help in tackling the ongoing pandemic, a new grand challenge that humanity is facing.

In this article, we discuss opportunities to conduct responsible IS research from the six themes that we have identified while the world wrestles with coronavirus. The six themes, 'expanding digital surveillance', 'tackling the infodemic', 'orchestrating data ecosystems', 'adapting information behaviours', 'developing the digital workplace', and 'maintaining social distancing', are grouped under two aggregated dimensions, that are, 'fighting against a pandemic' and 'adjusting to a new normal'. For each theme, we point out areas of research interest relevant to responsible IS research. Next, we provide a brief introduction to responsible IS research before we discuss research opportunities under each theme. Finally, we urge the IS community to play an active role by investing more time and effort to tackle SDG, which would in turn build capabilities in digital sustainability.

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2. Responsible IS research

To advance responsible research in business and management, the virtual organisation "Responsible Research for Business and Management" strives to encourage researchers in business schools worldwide to transform their research focus towards responsible science and to address problems relevant to society (RRBM Network) (https://www.rrbm.network).

Scholars have understood grand challenges as being characterised by numerous complexities and a radical form of uncertainty, cutting across the boundaries of multiple disciplines and jurisdictions (Ferraro, Etzion, & Gehman, 2015). This complexity, uncertainty, and evaluativity of grand challenges might lead to a variety of interrelated challenges manifested at different levels (Gümüsay & Haack, 2020). For example, the COVID-19 pandemic has presented people, organisations, and society with the challenges of collectively collecting, integrating, and analysing massive amounts of location-based data from isolated sources (i.e., orchestrating data ecosystems).

Responsible research in IS is still in its infancy. Walsham (2012) proposed that IS researchers should not limit their research attempts to subjects related to the use of ICTs in organisations but rather should adopt a broader and ethical vision that focuses on how ICTs can make the world a better place. Davison (2018) noted that most IS studies focus on the interests of organisational stakeholders and consequently neglect the social and cultural values important to other stakeholders.

The limited number of responsible IS studies can be categorised into two types. One stream of research focuses on examining the positive impacts of ICTs on stakeholders other than corporate entities, with a particular focus on how these technologies have the potential to make the world a better place (Díaz Andrade & Doolin, 2016; Ganju, Pavlou, & Banker, 2016; Oreglia & Srinivasan, 2016; Zheng & Yu, 2016). The other stream focuses on those who have appeared on traditional IS research outlets and aimed to explore the adverse outcomes caused by ICTs to organisations and society in general. This stream of research is often referred to as critical social IS research (Howcroft & Trauth, 2005). One emerging phenomenon of critical IS research, and also considered as responsible IS research, is the higher demand for the understanding of the dark side of ICTs (Polites, Serrano, Thatcher, & Matthews, 2018; Tarafdar, D'Arcy, Turel, & Gupta, 2015; Tarafdar, Gupta, & Turel, 2015).

Following the traditions of responsible IS studies, we suggest two areas that researchers could dive into in their investigation of the pandemic. First, how do we actualise the potentials of ICTs in fighting against the COVID-19 pandemic and adjusting to a new normal brought about by the pandemic? Second, how do we mitigate the ethical-and-negative issues associated with the use of ICTs when combating the pandemic? Next, we expand our thoughts on how these two areas of responsible IS research are related to the six themes that have emerged out of the COVID-19 pandemic.

3. Fighting against the pandemic

We group the three themes, 'expanding digital surveillance', 'tackling the infodemic', and 'orchestrating data ecosystems' into a significant dimension named 'fighting against a pandemic', because the three themes reflect technology, information, and data-level practices that might help combat COVID-19. Below, we elaborate on these themes, and possible responsible IS research areas related to them.

3.1. Expanding digital surveillance

The COVID-19 pandemic has brought new digital surveillance technologies such as facial recognition, mobile phone location-tracking, and space-based systems to the forefront of efforts to monitor the movement of citizens and track infected populations in real time (Kummitha, 2020). As infections continue to spread across the world, governments have increasingly sought to capitalise on the digital surveillance technologies and to partner with big tech corporations to assist the monitoring, detection, and prevention of COVID-19.

One area of responsible IS research could examine the practical side of digital surveillance technologies, with a particular focus on how the technologies could be useful in the fight against COVID-19. Our understanding of the technical functions of surveillance technologies will help to ensure healthy lives, promote the well-being of the global community, and thereby make the world a better place.

There's no questioning the need for digital surveillance technologies to combat the COVID-19 pandemic (Ting, Carin, Dzau, & Wong, 2020). However, how these systems would be useful in stopping the spread of COVID-19 remains under-explored. For example, the fact that marginalised groups such as lower-income and elderly individuals might not have mobile phones raises the concern about whether mobile phone location records represent the overall population (Schwartz & Crocker, 2020).

Another area of responsible IS study might focus on the ethical and negative issues associated with the use of digital surveillance technologies, mainly, the trade-offs between the degree of digital surveillance and individuals' privacy (De, Pandey, & Pal, 2020). For instance, the National Health Service (NHS) of the UK is partnering with Google to develop a shared data platform aimed at accelerating COVID-19 surveillance. Google was blamed for its breach of privacy during its partnership with the Royal Free London Trust. The company transferred identifiable patient records from the Trust to develop a clinical alert app without consent (Robert, 2020). Scholars who call for responsible IS research criticise the exclusive commitment of mainstream IS researchers to the creation of economic value for corporate entities (Davison, 2018). In other words, more IS studies that pay attention to the social dimensions and to other stakeholders should be encouraged. Hence, in the case of the NHS and Google as well as other similar public-private partnerships, responsible IS research might focus on issues such as to what extent should the data be collected and used, and how to deidentify and aggregate data to maintain the effectiveness of the surveillance technologies without undermining privacy (Sein, 2020).

3.2. Tackling the infodemic

The WHO 2020 situation report declared in February that COVID-19 creates an infodemic, which was referred to as "an overabundance of information—some accurate and some not—that makes it hard for people to find trustworthy sources and reliable guidance when they need it." The infodemic poses a serious challenge to public health because people in a pandemic need timely and accurate information and advice that guide them to protect each other and mitigate negative impacts. The WHO has made constant efforts to manage the infodemic. It has also invited multidisciplinary cooperation to respond to the infodemic effectively.

The infodemic can be categorised as a dark-side phenomenon of ICTs, which lies in the fields of investigation of responsible IS researchers. Responsible IS researchers may relate the infodemic phenomenon to the research stream of 'fake news' (Vosoughi, Roy, & Aral, 2018). Existing IS studies have examined fake news during the crisis and focused on analysing the phenomenon at the community level (e.g., a terrorist attack; an earthquake; a regional conflict; an epidemic; Kwon & Rao, 2017; Mendoza, Poblete, & Castillo, 2010; Oh, Gupta, Agrawal, & Rao, 2018; Volety, Valecha, Vemprala, Kwon, & Rao, 2018). This leaves the examination of fake news in a global level crisis mostly unexplored. Thus, responsible IS researchers may advance research into fake news by exploring how to tackle the infodemic brought about by the COVID-19 global pandemic.

Specifically, responsible IS researchers may investigate the infodemic phenomenon by drawing upon the accumulated knowledge related to fake news. Studies focused on examining what fuels the spread

and flourish of online fake news (Moravec, Minas, & Dennis, 2019; Oh et al., 2018) and how to deal with fake news through the specific designs of ICTs (Kim & Dennis, 2019; Ross et al., 2019) may provide specific initial ideas. Moreover, research should extend the subjects of study from ICT users and platforms to responding agencies such as governments and public health institutions, and study how these responding agencies inoculate and mitigate the infodemic during the COVID-19 pandemic. Furthermore, the large geographical and demographical impacts, exponential growth rate, and diverse types of misinformation in an infodemic may bring new insights into theories related to fake news or misinformation.

3.3. Orchestrating data ecosystems

In the case of the COVID-19 pandemic, a wide variety of distributed and decentralised entities are involved in the data production and collection processes. These entities include local and regional government authorities, technology developers and providers, healthcare institutions, private organisations, as well as local citizens. Additionally, massive amounts of location-based data are gathered from IoT platforms, social media applications, and mobile devices (Ting et al., 2020). Altogether, these entities, the data, and their interactions contribute to data ecosystems at the city, regional, and national levels.

These data ecosystems are multi-layered and embedded in pluralistic institutional environments with diverse cultures, structures, and priorities (Gupta, Panagiotopoulos, & Bowen, 2020). Responsible IS researchers should explore how to develop a holistic view of such complex data ecosystems, to enable data from different entities, platforms, devices, and applications to be integrated and analysed, and help entities in the ecosystems to make wise decisions in combating the COVID-19 pandemic. The concept of 'orchestration' can be adopted for such explorations. As a fundamental concept in the management literature, 'orchestration' has been frequently used in studies to examine the management of businesses and entrepreneurial and government networks and ecosystems (Clegg, Josserand, Mehra, & Pitsis, 2016; Cordella & Paletti, 2019; Cui & Pan, 2015; Dagnino, Levanti, Mocciaro, & Destri, 2016; Giudici, Reinmoeller, & Ravasi, 2018). Notably, these studies focus on identifying the coordination mechanisms that explain how a dominant organisation (e.g. a hub firm, a government authority) orchestrates a network or ecosystem.

In global crises such as the COVID-19 pandemic, where enormous amounts of data are generated instantly from isolated sources, not only an organisation with dominance and authority, but also all the entities involved in the data ecosystems, should participate in the orchestration processes. Data collaborations between all the entities must be formed rapidly to effectively combat the pandemic (Hua & Shaw, 2020). Hence, responsible IS researchers can take the lead in exploring the challenges of integrating and analysing the data assets across different entities in the data ecosystems, and how best to orchestrate the data ecosystems to promote productive data collaborations. These exploration efforts will help to address the data challenges brought about by the pandemic at the societal level and fulfil the aim of 'making the world a better place'.

4. Adjusting to a new normal

We categorise the remaining three themes, 'adapting information behaviours', 'developing the digital workplace', and 'maintaining social distancing', into a dimension called 'adjusting to a new normal', as these three themes represent the individual, organisational, and societal level practices of preparing for a new normal brought about by the COVID-19. Next, we discuss each theme and potential responsible IS research areas.

4.1. Adapting information behaviours

Individuals need to adapt to new information environments during the COVID-19 pandemic. Not only does the infodemic bring chaos to individuals' COVID-related information-seeking, evaluating, and sharing processes, but the emergence of a wide variety of online technologies also creates new challenges for individuals when performing their online information activities. Exploring how individuals adapt their information behaviours in these new online environments will help global citizens to survive the pandemic and prepare for the post-pandemic and future global crises (Pan, Cui, & Qian, 2020). Hence, such explorations might unearth plentiful opportunities for responsible IS research.

Studies that examine individual information behaviours during crises have focused primarily on the information-seeking and sharing behaviours of people affected by disasters (Lai & Tang, 2018; Pang, Karanasios, & Anwar, 2019; Pee, Pan, Li, & Jia, 2020; Rahmi, Joho, & Shirai, 2019). The large-scale impacts of the COVID-19 pandemic will provide responsible IS researchers with more diverse contexts to explore the information behaviours of different groups. For example, Pan et al. (2020) examined the information behaviours of six Chinese families who survived the community lockdown and identified two information practices and three mechanisms that different family members used to adapt to a new online life. It might also be interesting to explore information behaviours in other contexts, for instance, how employees adjust their information behaviours in a purely digital and virtual workplace and how educators and learners change their information behaviours in an online learning environment (Mogaji & Jain, 2020; Richter, 2020).

More importantly, certain new information environments may become a new normal for people worldwide, not only because of the unpredictable duration of the outbreak of the disease but also due to people's adaptation to and preference towards these new information environments. For example, it is unsurprising that e-learning will become a more common avenue for education in the post-COVID period, as will remote working (Caligiuri, De Cieri, Minbaeva, Verbeke, & Zimmermann, 2020; Mogaji & Jain, 2020). Hence, potential areas of focus for responsible IS researchers to conduct further studies are how individuals adapt their information behaviours in these new post-COVID environments and what the impacts of their adapting information behaviours are.

4.2. Developing the digital workplace

While many organisations began to develop strategies for a digital workplace before the COVID-19 pandemic, the outbreak of the disease has forced most organisations to launch new initiatives that enable them to accelerate the transformation to the digital workplace (Caligiuri et al., 2020). One example of an initiative is protecting the health of employees, keeping the business running, and preparing better for the recovery phase as organisations went through the rapid rollout of a remote working environment (Verbeemen & D'Amico, 2020). Additionally, organisations have quickly implemented a variety of digital infrastructures and tools to maintain uninterrupted service to their customers (Hines, 2020).

A rapid switch to a remote working environment might raise many challenges as the implementation of remote working in the pandemic is broader and deeper than most organisations realise (Verbeemen & D'Amico, 2020). Responsible IS researchers may focus on issues regarding how to realise the full potential of ICTs to facilitate a successful migration to a remote working environment, and thereby make a better workplace. For example, organising decentralised data in remote working environments increases the chances of cybercrime during the outbreak (Naidoo, 2020). Hence, there is an opportunity to conduct responsible IS studies on how to develop effective leadership, clear guidelines, and real commitment to secure organisational networks and data. Besides, responsible IS researchers may also investigate how to maintain employees' productivity and creativity in situations where employees are not used to a remote working environment, lack

appropriate devices and tools, and collaborate in isolated and lonely environments.

Moreover, responsible IS researchers should pay attention to social and moral issues related to the digital workplace in a pandemic. For instance, a blurring boundary between the professional and private lives of employees may raise concerns related to work-life balance. The risk of isolation and loneliness associated with remote working environments may harm the mental health of employees. The motivation to serve customers in a digital environment during the outbreak also drives organisations to implement tools that closely track customer data (Caimi, Anderson, & Hoppe, 2020). Organisations may use those data for corporate profits without considering the privacy of customers, which might further lead to breaches of personally-identifiable information (Posey, Raja, Crossler, & Burns, 2017). Responsible IS studies should be conducted to examine the occurrence context, negative consequences, and mitigation mechanisms of these social and moral issues.

4.3. Maintaining social distancing

It has been widely accepted that every country needs to impose social distancing to flatten the curve of the COVID-19 pandemic, slow the spread of the disease, and relieve the pressure on their healthcare systems (Lichfield, 2020). Social distancing is referred to as "all households reduce contact outside household, school or workplace by 75 %" (Ferguson, Laydon, & Nedjati-Gilani, 2020, p. 6). Research indicates that social distancing needs to last a long time due to the highly contagious nature of the COVID-19 virus, along with the fact that a vaccine will not be widely available in a short time (Lichfield, 2020). A recent study conducted by researchers from the school of public health at Harvard projected that prolonged or intermittent social distancing in the US might be maintained until 2022 (Kissler, Tedijanto, Goldstein, Grad, & Lipsitch, 2020).

Measures of social distancing such as lockdown, quarantine, and the closure of public places where people congregate are critical to mitigating the spread of the COVID-19 disease. However, these social distancing measures might lead to specific mental health problems such as anxiety, stress, and depression amongst the general public due to the loss of social connectedness and interactions (Galea, Merchant, & Lurie, 2020). The negative impacts are particularly significant among some marginalised groups such as people in low-paid or insecure occupations and those who must be quarantined because of their infection with the virus (Addelman, 2020). While research indicates that ICTs might help to mitigate mental health problems by increasing the opportunities of social connections and interactions, studies that investigate how ICTs might alleviate these consequences are still nascent.

Responsible IS researchers may take the opportunity to investigate these unexplored areas and demonstrate how ICTs reduce the side effects of social distancing and make the world a better place. As social distancing is expected to last long and become a new normal, responsible IS researchers might examine how to incorporate the design of 'socialising' into the ICTs that are widely used in e-learning and remote working environments. Additionally, as social cues such as human touch and body language are lost in ICTs, responsible IS researchers should explore ways to increase the feelings of social presence in ICTs (Richardson, Maeda, Lv, & Caskurlu, 2017). Furthermore, responsible IS researchers should explore areas related to the age-related digital divide during the pandemic, for example, how to drive the adoption of social technologies by the elderly (Niehaves & Plattfaut, 2014).

5. Digital sustainability: towards contributing to solving the new grand challenge and other SDG

Moving forward, the IS community has three excellent opportunities to make a definite contribution to the new grand challenge and other SDG. First, through developing responsible management research, we have shown how IS researchers could take the lead in exploring ways of realising the full potential of digital technologies in contributing to building a sustainable society (Hughes et al., 2019; Ismagilova, Hughes, Dwivedi, & Raman, 2019) as well as studying the emerging role of smart cities in helping achieving certain SDG (Dwivedi, Hughes, Ismagilova, Aarts, & Coombs, 2019; Israilidis, Odusanya, & Mazhar, 2019).

Second, as we continue to fight the pandemic while adjusting to the new normal, it is equally crucial that we mitigate the unintended negative, social, and ethical consequences brought about by the adoption of digital technologies. For example, a key question to ask among many, which is critical to maintaining sustainability, is how do we ensure that citizens are protected from potential harm such as digital exclusion, socio-economic discrimination, the digital divide, privacy violation, and cyber-attacks?

Third, as the pandemic continues to evolve, COVID-19 is changing the way we live and work and we therefore urge the IS community to play a more active role in addressing the SDG agenda set forth by the UN. Making practical impact (Pan & Pee, 2020) towards achieving SDG is possible if we explore the potential value of the concept and practice of digital sustainability. In fact, the IS community is best positioned to create knowledge and designs for digital sustainability. Digital sustainability, as we define it, is the convergence of digital and sustainability imperatives that involves a trans-disciplinary approach of deploying digital technologies in tackling sustainability issues. Given its digital enablement nature, digital sustainability could empower IS researchers to play a key role as we embark on the journey of tackling the SDG.

6. Implications for research

In the above discussion, we propose how conducting responsible IS research can contribute to tackling the COVID-19 pandemic, as a new grand challenge, and other SDG. As shown in the pandemic, the complexity, uncertainty, and evaluativity nature of grand challenges might lead to various interconnected challenges in different fields (Gümüsay & Haack, 2020).

This section turns to implications for responsible IS scholarship in future research. We advocate two strategies that could help to yield contributions to responsible IS research as well as the UN SDG agenda. First, we advocate that the issues emerged from tackling COVID-19 pandemic can be addressed by future IS research. The issues highlighted are closely related to other SDG. Therefore, an in-depth knowledge to respond to solving SDG and to mitigate the unintended consequences of dealing with the issues would be crucial. For example, the COVID-19 pandemic has brought challenges to areas such as healthcare, governance, education, employment, and socio-economic. In this essay, we identified technology, information, and data issues, when being addressed, could help to solve the challenges in these areas.

Second, we suggest applying the principles of responsible research to examine the identified issues. The RRBM Network has offered seven principles that support the foundation, credibility, and usefulness of responsible research (https://rrbm.network/position-paper/principles-of-responsible-science/). In addressing the identified IS-related issues, we recommend future responsible research apply these principles. For example, when addressing the issues of orchestrating data ecosystem, responsible IS scholars are encouraged to adopt the 'Stakeholder Involvement' principle to engage various data entities in the research process.

7. Conclusion

As people worldwide suffer from the devastating impacts of the COVID-19 pandemic on their lives, economics, and societies, researchers from various disciplines are ever more determined to make contributions to the fight against the current and future pandemics.

Aiming to demonstrate how IS research contributes to our understanding of how IS make the world a better place, the responsible IS researchers should take the lead in fighting against this new grand challenge. Additionally, it is important to learn from this pandemic and accumulate knowledge in tackling future grand challenges and other SDG. We hope this article provides insights for IS scholars to find ways to combat the new grand challenge, while, as a community, we embark on the ever more critical journey of tackling SDG through developing the concept and practice of digital sustainability.

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