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Opinion Paper

Will COVID-19 be the tipping point for the Intelligent Automation of work? A review of the debate and implications for research

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ABSTRACT

As part of the urgent need to respond to the COVID-19 pandemic, governments, healthcare providers, and businesses have looked to applications of Artificial Intelligence (AI) to compensate for the unavailability of human workers. This interest has renewed the debate regarding the use of AI for the automation of work, which has been described as Intelligent Automation (IA). A new dimension to this debate is whether COVID-19 will be the catalyst for higher IA adoption levels. This article reviews arguments in favour of COVID-19 increasing the level of IA adoption and possible counter-arguments. Key arguments in favour of increased IA adoption include consumer preferences changing to favour IA, increasing familiarity of IA technologies, and increased business confidence in IA. Counter-arguments include big data availability and reliability limitations, many tasks still favouring human skills over IA, the narrow capabilities of IA technologies, and a high availability of human workers. The article also discusses the implications of this debate for information management research and practice.

1. Introduction

The Coronavirus pandemic (COVID-19) has caused unprecedented impacts on health and global economies. These impacts have resulted in a renewed interest in the use of Artificial Intelligence (AI) and its subfields to respond to the health crisis and mitigate its effect on many industries and society. AI is the broad suite of technologies that can match or surpass human capabilities, particularly those involving cognition such as learning and problem solving (DeCanio, 2016). Applications of AI are wide-ranging and include knowledge reasoning, machine learning, natural language processing, computer vision, and robotics. For clarity, the term AI is used to refer to all these technologies in this paper.

AI is being deployed in healthcare to understand COVID-19 transmission, improve detection rates, develop trial vaccines and treatments, and assess the socio-economic impacts of the pandemic (Bullock, Luccioni, Hoffmann Pham, Sin Nga Lam, & Luengo-Oroz, 2020). Due to the unavailability of human workers, AI is also being used to support content monitoring on YouTube, and chatbots are being used for customer service work (Howard & Borenstein, 2020). Semi-autonomous robots have delivered food, medication and equipment and helped with cleaning and sterilisation in hospitals (OECD, 2020). Mobile robots have reminded parkgoers of social distancing requirements in Singapore, delivered food to residents staying at home in urban areas in the UK and represented isolating students at university graduation ceremonies in Japan (Tucker, 2020). These applications of AI can be considered examples of a new form of automation that Coombs, Hislop, Taneva, and Barnard (2020) describe as Intelligent Automation.

Intelligent Automation (IA) is defined as ‘the application of AI in ways that can learn, adapt and improve over time to automate tasks that were formally undertaken by a human’ (Coombs et al., 2020). Before the outbreak of COVID-19, there was considerable debate regarding the possible impacts of IA on future levels of employment. Analysts and commentators predicted mass unemployment from the automation of a wide range of jobs that involved predictable, repetitive work (Grace, Salvatier, Dafoe, Zhang, & Evans, 2018). Counter views proposed a future of AI and robotics augmenting many existing job roles, automating tasks rather than whole occupations (Acemoglu & Autor, 2011; Davenport & Kirby, 2016b). However, the global pandemic has re-invigorated this debate with several academics and commentators arguing that COVID-19 will provide the tipping point that accelerates the widespread adoption of IA. In this short paper, the two sides of this debate will be discussed in the light of COVID-19. Following this discussion, the paper reviews the implications for future information management research and practice before closing with concluding remarks.

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2. The argument for increased adoption rates of Intelligent Automation

Three main themes underpin the argument for increased adoption of IA following COVID-19. These themes are: consumer preferences changing to favour of IA; increasing familiarity of IA technologies; and increased business confidence in IA.

2.1. Consumer preferences changing to favour of IA

The global response to managing the COVID-19 pandemic has been characterised by the implementation of social distancing strategies and reduced human contact. In a BBC News article (Thomas, 2020), Martin Ford observes that before COVID-19, people said they would prefer a human element to their interactions, rather than having a fully automated experience. This preference for human contact dampened the level of consumer interest in using IA. However, Ford suggests that COVID-19 may start to change consumer preferences, as human contact has become a risky activity that may be harmful to people’s health. Self-service checkouts in retail stores and contactless payment offer further opportunities to avoid human contact. Consequently, people may interpret these technologies as helping to protect their health and improve their wellbeing. These positive experiences may present IA technologies in a new light, showing how they can improve our day-to-day lives and keep us safe. This change in perceptions may help IA technologies to become seen as helpful assistants rather than threatening overlords.

2.2. Increasing familiarity of IA technologies

There has also been a significant shift in the use of digital technologies such as video conferencing tools to maintain contact in the workplace and for social interactions. As people become more familiar and at ease with using these technologies, it is likely their trust in these tools will increase, creating opportunities for long term adoption (Howard & Borenstein, 2020). Culture theory helps us understand how groups undertake a cultural learning process resulting from the introduction to, and interactions with, technology (Walsh, Kefi, & Baskerville, 2010) Information Systems (IS) research that uses culture theory has proposed the concept of an IT culture. The IT culture concept is defined as a subset of IT-related values espoused by individuals (Walsh, 2014). It helps us understand individuals’ social practices when they interact with technology and may help explain their preferences to use it (Abubakre, Ravishankar, & Coombs, 2017). These social practices are influenced by the individual’s personal needs and motivations to use technology. Thus, by understanding a person’s IT needs and motivations, the IT culture concept can help explain the complexities of individuals’ actions and behaviours toward IT. The rapid growth in the use of IT, such as video conferencing blending work and social practices, may result in a shift in individuals’ IT culture orientations from a cautious or reluctant IT culture group to an embracing IT culture group. Further, less trust between people was a feature of human behaviour after the Spanish Flu pandemic (Frey, 2020). Consequently, there may be a widespread shift to more positive IT culture dispositions among many people, and an increasing distrust of people and real face-to-face interactions. These two factors may combine to create a favourable and receptive environment for the adoption of IA.

2.3. Increasing business confidence in IA

There has also been increased interest in IA technologies to reduce the number of people in the workplace. IA technologies do not require social distancing and are not at risk of catching the virus. Consequently, IA may provide an attractive alternative for some tasks that were previously undertaken by human workers. For example, the US retail giant Walmart is using robots to help with floor cleaning, and Amazon is already exploring the increased use of robots in their warehouses to help with sorting, shipping and packaging (Thomas, 2020). Danish UV disinfectant robots are being used in Chinese hospitals to destroy the DNA or RNA of any microorganisms in range. The robots can operate autonomously, ensuring that humans are not at risk of being exposed to harmful UV rays. Robots are being deployed in Rwanda in response to the pandemic to screen patients’ temperature, identify people not wearing masks and deliver medicine to infected patients (Tucker, 2020). It appears that businesses exploring the use of IA technologies before COVID-19 are rapidly converting their pilots to full organisational implementations. This change is demonstrated through the increased demand experienced by robot manufacturers (Corkery & Gelles, 2020). These rapid changes triggered by COVID-19 may provide the experience for employers to become more confident in adopting IA for manual, repetitive tasks, reducing the need for some workers. Indeed, historical experiences of previous recessions suggest that easily automatable jobs do not return after an economic crisis (Frey, 2020).

3. The argument against increased adoption rates of Intelligent Automation

While there is evidence to suggest that adoption rates of IA are likely to increase following COVID-19, four main themes have emerged to counter the argument. These themes are: big data availability and reliability limitations; many tasks still favouring humans; the narrow capabilities of IA technologies; and a high availability of human workers.

3.1. Big data availability and reliability limitations

Many IA technologies rely on large data sets to train algorithms to perform tasks such as detecting and diagnosing the COVID-19 virus, preventing or slowing the virus’ spread through surveillance and contact tracing, or improving early warning tools. However, gaining access to these data sets can be difficult. This challenge has led the OECD to call for policymakers to encourage sharing of medical, molecular, and scientific datasets and models to help AI researchers build useful tools (OECD, 2020). Collecting reliable data in a pandemic is also problematic, and national advice on protecting people from the infection has shifted, reflecting changing interpretations of the data held by governments. This problem has led some researchers to suggest that while AI may complement existing data mining techniques, it may not add as much value as initially hoped (Barber, 2020).

Similar limitations are evident in many other sectors. For example, in the UK manufacturing sector, the adoption of automation has been limited to the production line, because data are often scattered across a wide variety of different legacy systems that lack integration (DBE & IS, 2017). There may also be limitations with the quality of the data. If data are not timely, reliable, complete or precise enough, they may lead to decisions made on wrong insights (Günther, Mehrizi, Huysman, & Feldberg, 2017). Further, the data sets used for training algorithms may reflect human biases, so IA developers have to be careful not to inadvertently create an algorithm that may repeat the same biased decisions. Consequently, there may not be enough reliable past data or trustworthy algorithms for high levels of automated decision making (Davenport, 2020).

3.2. Many tasks still favour humans

Concerns about widespread technological unemployment from the rapid adoption of IA may also be overestimated. In an interview with Bloomberg (Bahat, 2020), Economists Andrew McAfee and Erik Brynjolfsson acknowledge that employment tends to rebound more slowly after each recession because technology advances and automation stays. However, they argue that even though employment is slow to
recover after economic crises, it does eventually rebound through innovations that require tasks that can only be done by humans. For example, creative tasks such as entrepreneurship and creative writing, social interactions that require emotional intelligence, and physical tasks that require dexterity and mobility still favour humans over AI. Jobs such as Data Scientists now exist because computer-processing power has advanced to enable an analysis of big data for humans to interpret (Brynjolfsson & McAfee, 2015; Davenport & Kirby, 2016a). McAfee and Brynjolfsson conclude that COVID-19 will not be the start of large-scale technological unemployment.

3.3. Narrow capabilities of IA technologies

A further reason why IA adoption rates may not increase is that IA technologies are narrow in their capabilities, unable to match human intelligence and dexterity. Robots have their strengths, such as lifting heavy car doors on automotive production lines, but they struggle to pick up a piece of paper lying flat on a table (Simon, 2020). This narrow capability is likely to mean that it is only possible to apply IA to parts of a business process, rather than automating a whole business process. For example, a Roomba robotic cleaner can vacuum a floor, potentially removing that task from a human cleaner. However, the Roomba cannot complete dusting and tidying tasks that may also be part of the normal cleaning process. Thus, for business processes that comprise of multiple work tasks, the narrow capabilities of IA are likely to limit the rate of adoption.

One way of compensating for narrow IA capabilities is by redesigning human co-worker practices to complete related tasks that are not fully automated. However, such redesigns may not be straightforward. Caliburger’s burger-flipping robot, ‘Flippy’ famously encountered difficulties on its first day of operation because its human co-workers could not assemble the burgers as quickly as Flippy could grill the patties (Graham, 2019). Limitations such as these may mean that while there is renewed interest in using IA technologies from COVID-19, the recruitment of human workers may remain a quicker and more effective way to respond to sudden growth in demand. For example, Amazon, an organisation frequently publicised for using robots in their warehouses, announced in April 2020 that they had hired over 175,000 people in their fulfilment and delivery network in response to increased customer demand (Amazon, 2020). Although hiring human workers may present some risks, the benefits of human flexibility and adaptability in many sectors may still outweigh the technical challenges of implementing IA in the workplace.

3.4. High availability of human workers

A further factor to consider is the ready supply of human labour in many countries due to high levels of COVID-19 related unemployment. The pandemic has created economic impacts across the world far higher than the 2008–9 financial crisis. The International Labour Organisation has reported that the COVID-19 disaster could wipe out 6.7 per cent of working hours globally in the second quarter of 2020, the equivalent of 195 million full-time workers (ILO, 2020). The workers that have experienced the most dramatic impacts of the pandemic are in four sectors: food and accommodation (144 million workers); retail and wholesale (482 million); business services and administration (157 million); and manufacturing (463 million) (UN News, 2020). A further concern is that in low and middle-income countries, the worst-hit sectors have a high number of low-wage workers in informal employment. These workers often have limited access to health services and government welfare. For example, India has about 400 million workers in informal employment that are facing greater impoverishment. Brazil and Nigeria have similar levels of informal employment and may also face similar risks (UN News, 2020). Consequently, national governments are likely to come under pressure to stimulate employment-creating opportunities to reignite their economies and reduce the strain on state welfare systems. Further, business leaders may be able to take advantage of high availability of workers by keeping labour costs down, perhaps employing higher numbers of employees to work in short shift patterns to comply with social distancing requirements. Many firms are looking for ways to pivot their business model in response to changing consumer preferences, such as growth in online shopping habits, due to the pandemic. Business leaders may decide that pursuing a new business model with a human labour force may be enough of an immediate challenge, without adding further complexity from the implementation of IA technologies.

The previous sections have reviewed the arguments for and against increased adoption levels of IA as a consequence of COVID-19. The following section considers the implications of this review for information management research and practice.

4. Implications for research

IS researchers are well placed to explore the implications of the IA adoption debate because they study the intersection of many scholarly disciplines, considering both social and technical dimensions. The COVID-19 pandemic has reinforced the need for urgent research into the impacts of IA on work, organisations and society. The debate discussed in this article suggests three main areas for future research.

First, the success of IA technologies is heavily dependent on the availability and reliability of big data to use as training sets for algorithmic decision-making. If the data supply is lacking, then the ability for IA to be deployed is also limited. The COVID-19 pandemic also illustrates that reactionary big data collection is inadequate for a timely response to rapidly changing events. Therefore, we are reliant on the data that has already been collected, whether it can be transferred from one context to another, and whether it can be synthesised from various big data sources (Barber, 2020, Günther et al., 2017). In a global healthcare context achieving high levels of portability and interconnectivity of big data may be particularly challenging because of privacy regulations, data silos from strained international relations between significant players, and outdated error-filled databases. Business applications of IA face similar challenges. Many organisations have considerable data resource but in a disorganised, inconsistent and disconnected form. Necessary legal data protection requirements control the sharing and use of data within and between organisations, which may slow the adoption of IA. Therefore, further research is needed to investigate how an adequate big data supply can be orchestrated for IA development, without compromising human rights and privacy.

Second, it would be valuable to draw on the extensive IS literature on the role of trust in technology adoption (see for example MISQ’s curation on trust: Söllner, Benbasat, Gefen, Marco, & Pavlou, 2018) and examine whether the COVID-19 pandemic has instigated a shift in people’s attitudes towards machine contact instead of human contact. Technology has been vital during global lockdowns for ensuring business continuity through remote working, healthcare provision, entertainment and maintaining social connections. The IT culture of many individuals may have shifted to a more positive disposition towards technologies. Therefore, it would be valuable to understand whether people’s attitude toward and trust in IA technologies has changed and whether this change persists beyond the COVID-19 crisis. A further important avenue for trust-focused research would be to investigate whether people’s level of trust in IA varies depending on the type of IA technology involved. People may be more inclined to consider investing in new IA applications that combine technologies that they have become familiar with during lockdown, such as video conferencing with new IA innovations. For example, Suitabletech’s Beam robot enables an individual to have videoconference style telepresence, moving around and interacting remotely with other people at eye level. Therefore, it would be valuable to understand whether the high usage rates of particular technology types during COVID-19, such as video conferencing
applications, act as a catalyst for further accelerated growth in the adoption of related IA innovations.

Third, it will be essential to investigate how COVID-19 changes the balance of demand between human labour and IA technologies. The pandemic has resulted in unprecedented unemployment levels in many countries and a global economic recession. How fast global economies recover from these impacts is likely to depend on how long human contact remains a risk factor, and the need for continued social distancing. Current work environments are not designed for these new constraints, and while workarounds can provide some business continuity, it is likely to be at reduced capacity. IA technologies may prove attractive as pandemic proof alternatives to human workers, but they may also require substantial reconfiguration of work environments. Alternatively, innovations in ways of remote working may prove more attractive, drawing on individual skills but at a distance. For example, people have been using 3D printing to produce products from their own homes, creating a new form of micro-manufacturing (Statt, 2020). Therefore, further research on how organisations determine which tasks require human contact and which are appropriate for IA, and the factors shaping this decision-making process would be valuable. It would also be useful to explore how organisations develop strategies that combine the strengths of IA and their human workforce in a post-COVID-19 world.

5. Implications for practice

An analysis of the accelerating IA debate also reveals several implications for practice. First, IS practitioners must keep a focus on the limitations of IA. There is strong evidence to suggest that IA deployments can provide value to businesses (Coombs et al., 2020). However, these value-generating deployments are likely to focus on tasks that are highly predictable and routine. While researchers are working hard to extend the capabilities of IA to more complex tasks, it is likely that IA support will remain tied to narrow, highly codified activities for some time. Second, automation anxiety levels among the workforce are likely to be high because of the global recession and fears over job security (Frey, 2020). Therefore, it is vital that IS practitioners pro-actively communicate their plans for IA use in the organisation and the implications for organisational change. Third, IA deployment experiences suggest that business process performance improvements are often achieved by combining the technical capabilities of IA with the social skills of human workers in hybrid worker teams (Schwartz, Kriege, & Zinnikus, 2016). Therefore, business leaders may need to consider new job redesign strategies that take into account role changes and new skill requirements for human workers to maximise the return from IA investments.

6. Concluding remarks

While the post COVID-19 future remains uncertain, it is clear that information systems and information management will be at the heart of the global recovery. IS scholars have an essential role in providing timely research insights that can help shape this future, hopefully leading to a better world.

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