

1-2020

Addressing the Role of Digital Technology in the COVID-19 Recovery

Ramiro Montealegre

University of Colorado at Boulder, ramiro.montealegre@colorado.edu

Follow this and additional works at: <https://aisel.aisnet.org/relcasi>

Recommended Citation

Montealegre, Ramiro (2020) "Addressing the Role of Digital Technology in the COVID-19 Recovery,"

RELCASI: Vol. 12 : Iss. 1 , Paper 4.

DOI: 10.17705/1relc.00074

Available at: <https://aisel.aisnet.org/relcasi/vol12/iss1/3>

This material is brought to you by the AIS Journals at AIS Electronic Library (AISeL). It has been accepted for inclusion in RELCASI by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.



Addressing the Role of Digital Technology in the COVID-19 Recovery

Afrontando el Papel de la Tecnología Digital en la Recuperación del COVID-19

Enfrentando o Papel da Tecnologia Digital na Recuperação COVID-19

Ramiro Montealegre

University of Colorado
Boulder, Colorado, USA

Ramiro.Montealegre@Colorado.edu

Abstract

Given the accelerated adoption of technology during coronavirus pandemic (COVID-19) and the emergence of new needs in terms of new products and services, new business models, and new ways of organizing, the question of how digital technology will impact the recovery after the pandemic is highly salient for scholars of strategy, management, and information systems (IS). This paper attempts to interpret the progress, direction, and purpose of the current research related to digital transformation—the process of digital technology enabled changes. It highlights the importance of taking stock of what we know about digital transformation and shedding more light on what is unique about the post-pandemic recovery phenomenon. To illustrate the potential lasting effect of digital technology in the COVID-19 recovery, four areas in which the pandemic accelerated digital adoption globally are analyzed in detailed: remote work, virtual healthcare, remote learning, and online grocery shopping. Then, the article illustrates the implications for future research at the crossroads between the COVID-19 recovery and digital transformation across multiple levels of analysis, including individual, organization, and society.

Keywords: Digital technology; digital transformation; crisis recovery; COVID-19 recovery

Resumen

Dada la adopción acelerada de tecnología durante la pandemia de coronavirus (COVID-19) y la aparición de nuevas necesidades en términos de nuevos productos y servicios, nuevos modelos de negocio y nuevas formas de organización, la cuestión de cómo la tecnología digital impactará en la recuperación después de la pandemia es muy importante para los investigadores en las áreas de estrategia, gestión y sistemas de información (SI). Este artículo intenta interpretar el progreso, la dirección y el propósito de la investigación actual relacionada con la transformación digital: el proceso de la tecnología digital permitió cambios. Se destaca la importancia de hacer un balance de lo que sabemos sobre la transformación digital y arrojar más luz sobre lo que es único sobre el fenómeno de recuperación pospandémica. Para ilustrar el posible efecto duradero de la tecnología digital en la recuperación de COVID-19, se analizan en detalle cuatro áreas en las que la pandemia aceleró la adopción digital a nivel mundial: trabajo remoto, atención médica virtual, aprendizaje remoto y compras de comestibles en línea. Luego, el artículo ilustra las implicaciones para la investigación futura en la encrucijada entre la recuperación de COVID-19 y la transformación digital en múltiples niveles de análisis, incluidos el individuo, la organización y la sociedad.

Palabras clave: Tecnología digital; transformación digital; recuperación de crisis; recuperación de COVID-19.

Resumo

Dada a adoção acelerada da tecnologia durante a pandemia de coronavírus (COVID-19) e o surgimento de novas necessidades em termos de novos produtos e serviços, novos modelos de negócios e novas formas de organização, a questão de como a tecnologia digital impactará a recuperação após a pandemia é altamente saliente para investigadores nas áreas de estratégia, gestão e sistemas de informação (SI). Este artigo tenta interpretar o progresso, a direção e o propósito da pesquisa atual relacionada à transformação digital - o processo da tecnologia digital possibilitou mudanças. Ele destaca a importância de fazer um balanço do que sabemos sobre a transformação digital e lançar mais luz sobre o que é único sobre o fenômeno de recuperação pós-pandemia. Para ilustrar o potencial efeito duradouro da tecnologia digital na recuperação do COVID-19, quatro áreas nas quais a pandemia acelerou a adoção digital globalmente são analisadas em detalhes: trabalho remoto, assistência médica virtual, aprendizagem remota e compras online de alimentos. Em seguida, o artigo ilustra as implicações para pesquisas futuras na encruzilhada entre a recuperação do COVID-19 e a transformação digital em vários níveis de análise, incluindo indivíduo, organização e sociedade.

Palavras-chave: Tecnologia digital; transformação digital; recuperação de crise; recuperação COVID-19

1 Introduction

The COVID-19 pandemic shocked the world and placed enormous pressures on the health care, retail, travel and tourism, restaurants, cafes, bars and other food services, and sports and performing art industries, among many others. Many governments around the world responded by issuing different degrees of mandatory lockdowns and quarantines requirements, fearing infection simply from being near other people. During that period, homes became multifunctional refuges and transformations took place in the way people interacted with loved ones, did work and learn, got medical care, spent leisure time, and conducted many of the routine transactions of life. Companies improvised and found different means of conducting work, staying relevant, and continuing to operate.

While it was not a welcomed shock to the world, the COVID-19 also proved digital technology's potential as a great enabler. The world witnessed an increased digitization, manifested in the extensive reliance of societies, businesses, and individuals to much of their activities throughout the pandemic. Online shopping, contactless payments, and robotic deliveries kept many consumer businesses afloat. Remote work and learning—and telehealth in some countries—became widespread. Online entertainment, streaming, and gaming also gained significant traction. Individuals and companies moved more starkly than ever to embrace both the virtual and physical work arrangements. In addition, these technologies enabled quick creative innovations to secure digital access to products and services across different sectors from banks to grocery stores to gymnasiums and art performances. Some trends that were expected to unfold over several years took hold in a matter of weeks. Digital and alternative fulfillment models (such as curbside pickup, automated deliveries, contactless payments in the retailing sector), which were previously viewed as experimental, suddenly became must-haves. These changes accelerated the migration to digital technologies at stunning scale and speed, across every sector vaulting at least five years forward in digital adoption, according to some estimations (Baig, et al., 2020).

It would be a huge mistake, however, to think that the COVID-19 pandemic was the end of the traditional, non-digital-enabled fabric of our society. Nonetheless, it showed that pre-pandemic practices, processes, and structures were designed to support business-as-usual and were not suited for dealing with uncertain, emergency, and large-shock situations like this one. At the same time, we must be aware that much of the use of digital technologies during COVID-19 involved improvisation, and temporally relaxed some trends (such as the previously rising privacy and security concerns). Although it is too early to estimate which of these temporary digital shifts will hold, it is likely that digital will play a defining role in the pandemic recovery—and will even become catalyst to longer-term changes. Even for industries and companies that were able to survive the downturn, including those that were vital to our economic system during this period,

will face a critical period of adjustment before the changes made during the pandemic become the new business-as-usual. This is exactly what happens every time there is a major crisis: a period of *creative destruction*, as called by economist Joseph Schumpeter. This is the cycle where a crisis causes declining industries and marginally successful business models to disappear faster than they would have if the economy had continued to grow. As Stanford economist Paul Romer reminds us, however, “a crisis is a terrible thing to waste.” This moment gives the opportunity to shift and reset our strategy. Every company and its leaders will have to reflect on how to survive, stay relevant, and grow in the post-pandemic era. In fact, as vaccines rolled out, lockdowns and quarantines lifted and many companies started returning to business, inconsistencies were encountered in demand for their products and services, customers who suddenly preferred digital interactions, and faster organizational metabolisms enabled by remote work.

Therefore, given this accelerated adoption of technology during COVID-19 and the emergence of new needs and expectatins in terms of products and services, business models, and ways of organizing—that may have a long-lasting impact beyond COVID-19—the question of how digital technology will impact the recovery after the pandemic is highly salient for scholars of strategy, management, and IS. The aim of this article is to interpret the nature of this acceleration and effects of technology on individuals, businesses, and societies. The good news is that while individuals, businesses, and societies had to be inventive and adaptive in their responses during the pandemic, we are not moving into entirely uncharted territory. In fact, even before COVID-19, many companies worldwide had shifted in order to better compete in a business landscape characterized by strong customer-centricity, complexity, dynamic, and technology. In that process they embarked in digital technology-enabled changes, a process termed “digital transformation.” During the pandemic, many more companies joined them, and more will continue to do so in the post-pandemic years. Our cumulative experience of what makes a digital transformation succeed and what gets in its way can offer valuable insight at these challenging times. The lessons from the past—on how to acknowledge and balance the roles of technology, social needs, work arrangements, and personal preferences—are of crucial importance to us now. The importance of taking stock of what we know about digital transformation and shedding more light on what is unique about the post-pandemic recovery phenomenon—underscores the need to expand the research agenda on digital transformation.

2 Theoretical background/Literature review

“Digital transformation” was a buzz phrase prior to the coronavirus crisis. It was already occurring but not universally. A survey in October 2018 found that 85 percent of respondents wanted their operations to be mostly or entirely digital but only 18 percent actually were (McKinsey & Company, 2018). Companies that had embarked on digital transformation intelligently, however, were seeing benefits in productivity, quality, and end-customer connectivity. Similarly, according to research by International Data Corporation (IDC), in 2019 companies spent nearly \$1.2 trillion on digital transformation. Yet, only 13 percent of leaders believed their organizations were truly ready to compete in the digital age (IDC, 2019). Since the COVID-19 pandemic, digital transformation is becoming a reality in many cases—and a necessity for all.

It is important to note that the term “digital transformation” has been miss- and over-used. Leaders in various industry circles use that term inconsistently to describe various strategizing and organizing perspectives. These perspectives range from a focus on choosing an appropriate mix of technologies and integrate them across channels, to digital customer engagement, to new digital business models and more. Here, we follow Tabrizi, Lam, Girard, & Irwin (2019) that argues that “digital transformation is fundamentally not about technology, but about strategy”, meaning that senior leadership teams must find ways to capitalize on new and unexpected business model innovations that create, deliver, and capture values in today’s dynamic business environment. We identify digital transformation as “a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies” (Vial, 2019, p.118). A recent review of the emerging literature on digital transformation by Gregory Vial provides an initial integrative understanding of digital transformation (Vial, 2019). This review and synthesis of knowledge that has been accumulated thus far is a useful point of departure for conducting further work at the intersection between the COVID-19 recovery and digital transformation.

The existing literature stream on digital transformation has clarified the unique characteristics and properties of digital technologies, their flexibility, malleability, and so on (e.g., Kallinikos, Aaltonen, & Marton, 2013; Gregory, Wagner, Tumbas, & Drechsler, 2019). It has also identified how digital technologies through these unique properties offer new opportunities for the creation of new infrastructures, products, and business models (Andal-Ancion, Cartwright, & Yip, 2003; Henfridsson & Bygstad, 2013; Lyytinen, Yoo, & Borland,

2016; Montealegre, Iyengar, & Sweeney, 2019; Nambisan, Lyytinen, Majchrzak, & Song, 2017), reshaping ways of organizing for innovation along the way (Yoo, Boland, Lyytinen, & Majchrzak, 2012). At the same time, digital technologies not only provide new opportunities for innovation but also impact societies, organizations, and individuals more directly than ever before (Cascio & Montealegre, 2016). They have become significantly more affordable and accessible to everyone, embedding themselves into society and changing consumer behaviors and expectations (Gregory, Kaganer, Henfridsson, & Ruch, 2018). Furthermore, the blending of digital technologies within firms' settings (Woodard, Ramasubbu, Tschang, & Sambamurthy, 2013) produces constant changes not only in customer expectations but also in the competitive landscape as entry barriers are lowered and new platform business models rise (Hansen & Sia, 2015; Huang, Henfridsson, Liu, & Newell, 2017; Sia, Soh, & Weill, 2016). Scholars across multiple disciplines have shed light on new ways of organizing, new business models, and a new generation of digital technology that in many ways has enabled and stimulated these developments (Yoo, Boland, Lyytinen, & Majchrzak, 2012). In turn, these new developments have started to put firms across a variety of industries (e.g., media and entertainment, banking and finance, automotive, retail, and education) under pressure to renew themselves as their external environment has started to be characterized by even greater velocity of change, uncertainty, complexity, and ambiguity than ever before.

In the post-pandemic era, the phenomenon of digital transformation is no longer just associated with the “new” (new products and services including digital-first experiences, new business models including platform businesses, new enabling digital technologies, new ways of organizing, etc.) that emerges outside the realm of influence, control and immediate relevance for traditional industries. Instead, digital transformation is also associated with the “renovation” of the “old” (e.g., established hierarchical structures, established organizational cultures, established competencies and sets of enabling resources) inside firms as they embrace innovation and renovation (Gregory, Wagner, Tumbas, & Drechsler, 2019). In sum, digital transformation post-pandemic means more than the emergence of “the new” that has been extensively studied over the past decade.

At the center of this era is the accelerated adoption of digital technology, manifested in consumers, employees and citizens across all demographics and sectors worldwide embracing an array of digital activities and technologies throughout their personal and professional lives as well as transforming their expectations. A process that, as prior research has found, triggers significant pressure on firms to transform their organizational structures and legacy systems, overcome structural inertia, and reinvent their models and approaches to value creation and capture (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013; Sebastian et al., 2017; Gregory, Wagner, Tumbas, & Drechsler, 2019). An important consequence of this post pandemic digital environment is enhanced autonomy, that is, the practical capacities of individuals to do more for and by themselves, in loose commonality with others, and without being constrained by traditional hierarchical models of social and economic organization.

The importance of taking stock of what we know about digital transformation and shedding more light on what is unique about the COVID-19 recovery phenomenon—underscores the need to expand the research agenda on digital transformation. There are at least four key questions that as strategy, management, and IS scholars, we need to pay more attention to and investigate:

1. Why does the post-pandemic era trigger digital transformation in firms?
2. What are the key drivers of this digital transformation in firms' immediate environment?
3. How might these drivers alter the strategy, structure, culture, competencies, skills and technology platforms of firms?
4. As well as several open questions related to the trajectories of digital transformation journeys inside firms.

3 Potential Lasting Digital Effects in the Post-Pandemic Era

There are reasons to be optimistic for the potential lasting effects of the digital explorations and experiments that took place during the global pandemic (Baig, et al. 2020). There are fueled by the emergence of new needs and expectations of individuals, companies, and societies as well as investments in the technology itself (Remes, et al. 2021). In investigating digital behavior stickiness, however, it is important to address the dynamics across four broad categories: consumer responses, company responses, the role of government, and the adequacy of the infrastructure. While consumer value, experience, and investments are critical in determining what behavior will stick, company and government actions will also matter.

Furthermore, having the adequate infrastructure needed for the operation of an enterprise or society is an important precondition.

To illustrate the potential lasting effect of digital technology in the COVID-19 recovery, consider just four areas in which the pandemic accelerated digital adoption globally: remote work, virtual healthcare, remote learning, and online grocery shopping. In each of these areas crucial digital explorations and experiments were interweaved during the pandemic to facilitate staying relevant and continuing to operate. Next, the potential of digital stickiness post-pandemic is analyzed for each of these areas addressing the dynamics across customer, company, government, and infrastructure. Table 1 outlines key questions for scholars of strategy, management, and IS about the potential of evolving the pandemic digital explorations and experiments into stable and institutionalized solutions in the post-pandemic era.

	Remote Work	Virtual Healthcare	Remote Learning	Online Grocery
Customer	<p>What value do workers find in remote work?</p> <p>How can employees find home-work balance?</p> <p>How can employees work and collaborate remotely?</p>	<p>What value do patients find value in virtual healthcare?</p> <p>How satisfied are patients with the end-to-end virtual health experience?</p>	<p>What value do students, teachers and parents find in remote learning?</p> <p>What is the student impact of remote education on primary, secondary, and higher education?</p>	<p>Given the variety of online shopping models in different countries, what value do consumer find value in these models?</p> <p>How satisfied are consumers with the end-to-end consumption experience of each of these models?</p>
Company	<p>How to provide reskilling and upskilling training and education to support employees?</p> <p>How to configure/re-configure workplaces to support employees?</p>	<p>How to provide reskilling and upskilling training and education to support patient and their families, healthcare providers and healthcare administrators?</p> <p>How to configure/re-configure workplaces to support patients and employees?</p>	<p>What role does remote learning play within the school educational strategy?</p> <p>How to provide reskilling and upskilling training and education to support students, parents, educators, and school administrators?</p>	<p>What type of long-term investments have grocers made in their offers of online shopping?</p> <p>How to grocers have configure/re-configure their stores and delivery systems to support online grocery shopping?</p>
Government	<p>What regulations and incentives exist to support remote work employees as well as gig workers?</p> <p>What is the impact of remote work on urban economies, transportation, and consumer spending, among other issues?</p>	<p>What regulations and incentives exist to support virtual healthcare?</p> <p>How to support special-needs patients (low-income, old, and living in rural areas) to have access to technology and internet connectivity facilitating virtual healthcare?</p>	<p>What regulations and incentives exist to support remote learning?</p> <p>What strategies will the government take to mitigate learning gaps and inequalities among students?</p>	<p>What regulations exist to support and protect customers in online shopping?</p> <p>How is the government supporting special-needs shoppers (low-income, old, and living in rural areas) to have access to technology and internet connectivity facilitating online grocery shopping?</p>
Infrastructure	<p>Is the company providing the appropriate access to technology and internet connectivity to support remote work?</p> <p>Is the national infrastructure adequate for enabling remote work?</p>	<p>How are healthcare institutions designing/ /re-configuring their infrastructures to support virtual healthcare?</p> <p>Is the national infrastructure adequate for enabling virtual healthcare?</p>	<p>How are educational institutions designing/ /re-configuring their infrastructures to support remote learning as well as remote teaching?</p> <p>Is the national infrastructure adequate for enabling remote learning?</p>	<p>How are grocers designing/ /re-configuring their infrastructures to support online shopping and physical deliveries?</p> <p>Is the national infrastructure adequate for enabling online shopping and physical delivery?</p>

Table 1. Questions for Scholars of Strategy, Management, and IS When Evolving Digital Explorations and Experiments into stable and Institutionalized Solutions

Remote Work. It is defined here as the work that does not require interpersonal interaction or a physical presence at a specific worksite. During the quarantines, lockdowns, work closures, and self-imposed isolation, tens of millions around the world were pushed to work from home (Brynjolfsson, et. al., 2020). COVID-19 accelerated a workplace experiment that had struggled to gain traction pre-pandemic.

As many people have started to return to the workplace as economies reopen, companies have indicated in surveys that hybrid models of remote work for some employees are here to stay (Lund, Madgavkar, Manyika, & Smit, 2020). Yet, remote work raises a vast array of issues and challenges for employees, employers, governments, and societies (Rothbard, Beetz, & Harari, 2021). This calls for future research about factors driving and enable stickiness of remote work in different cultures and societies, as well as its implications.

In the United States, remote work was associated to the increased spending on home-buying and remodeling as well as household furnishings, equipment and small electrical appliances, items that facilitated life at home, home-related improvements. In France, the government offered targeted stimulus supporting home improvements (Remes, et al., 2021). It was initially expected that remote work would have enabled an increase in “free-time” for employees due to daily commuting. Yet, data in the United States shows that over half of these time savings has been allocated to more time working, and the average workday duration was actually 45 minutes longer as of June 2020 (DeFilippis, et al., 2020).

Furthermore, the potential for remote work depends on the mix of activities undertaken in each occupation and on their physical, spatial, and interpersonal context (Lund, et al., 2021). If employees need to be physically present on site to do a task, interact with others, or use location-specific machinery or equipment, work cannot be done remotely. These include providing care, operating machinery, using lab equipment, and processing customer transactions in a store. In contrast, activities such as gathering data, communicating with others, teaching and counseling, and coding data can be done remotely. Therefore, remote work potential is concentrated in specific sectors like finance, management, telecommunications, education but not in others like agriculture, food services, construction, mining, and transportation and warehousing.

The potential for remote work varies also across countries. In several advanced economies providing services could dedicate time to working remotely without losing productivity. In emerging economies, employment is skewed toward occupations that require physical and manual activities in sectors like agriculture and manufacturing, and therefore, the potential for remote work will be much lower.

Virtual healthcare. It refers to the “virtual visits” that take place between patients and clinicians via communications technology—the video and audio connectivity that allows “virtual” meetings to occur in real time, from virtually any location.

For about five years before COVID-19, virtual health grew steadily in terms of visits and spending in Western Europe and the United States. It represented, however, a very small percentage of the overall healthcare activity (IQVIA Institute, 2018). As the pandemic led to global medical office closures and made consumers apprehensive about visiting healthcare providers, virtual healthcare accelerated dramatically. In the United States, for example, virtual healthcare visits increased 25-fold from February to April 2020, with pronounced adoption among older populations (Koonin et al. 2020). In France, virtual visits increased from an average of 10,000 a week before March 2020 to 500,000 a week in late March. In Germany, virtual health visits increased ten times from February to March 2020. In the United Kingdom, this type of visits grew 2.5 during the same period (OECD, 2020). In China, 50 percent of medical care moved online to fight the coronavirus, building upon existing growth of virtual health delivery care (Handley, 2020).

As different countries are starting to reopen offices and consumers regain comfort with in-person appointments, it is expected the physical healthcare visits will increase. Yet, it is also expected that virtual healthcare will stabilize at higher than pre-pandemic levels and continue growing. Some of the drivers of this trend include patient satisfaction, physician satisfaction, and enabling regulatory environments.

The relatively lower cost of virtual appointments provides an opportunity for consumer cost savings, especially for the un- or under-insured population. Virtual health can also help alleviate transportation barriers to healthcare access, which tends to impact older, poorer, and minority patients (Sayed, Gerber, & Sharp, 2013).

Additionally, as we mentioned above, virtual health provides strong benefits for healthcare accessibility in China, the United States, and Western Europe. Yet, in developing countries, it may help solving logistical constraints, providing support to weak public health systems and connect global networks of healthcare

workers (McElroy, Day, & Becevic 2020). Furthermore, initiatives in this area can solve ongoing issues to quality care by providing a cost-effective and reliable solution. However, the existence (or lack of) adequate infrastructure will impact its adoption.

Virtual healthcare also represents an opportunity for greater healthcare provider and insurer effectiveness and efficiency. In instances of high healthcare demand volume (such as emergencies), virtual health allows for efficient triage and emergency management to focus care services on the highest risk populations (OECD, 2020). Virtual healthcare may also help reduce healthcare costs and improve patient care, as it enhances opportunities for preventive and early-intervention care (Bestsenny, Gilbert, Harris, & Rost, 2020).

One of the biggest unknown for post-COVID-19 virtual health use is regulatory policies. The extent to which virtual visits are regulated by governments and accepted by insurances has the potential to fundamentally shape the virtual health adoption in different countries.

Remote learning. It is where the student and the educator, or information source, are not physically present in a traditional classroom environment. Information is relayed through technology, such as discussion boards, video conferencing, and online assessments. Remote learning can occur synchronously with real-time peer-to-peer interaction and collaboration, or asynchronously, with self-paced learning activities that take place independently of the instructor.

The pandemic caused widespread disruption to education around the world. At the peak, nearly 1.6 billion children globally were impacted by school closures, and schools were forced to rapidly switch to remote learning models. In comparison, pre-pandemic only about 0.5 percent of primary and secondary students in the United States were enrolled in virtual learning environments (Digital Learning Collaborative, 2019). In Europe, a report by International Research on K-12 online learning in 2012 found there were 68 European virtual schools and colleges distributed across 18 countries while other researchers estimated the number could have been closer to 100 (Dichev, Dicheva, Agre, & Angelova, 2013). In Asia and Latin America, there is less information about remote learning pre-pandemic.

COVID-19 created the opportunity for schools to use technological tools to keep educating students and even improve education. It even helped schools to lower costs during the pandemic, although that is dependent on schools running effective online learning programs. In some cases, however, while teaching was provided remotely, parents and teachers alike felt that quality suffered (Odeger, Schuller, & Ito, 2020). Furthermore, in terms of infrastructure, reliable internet access played a role in determining whether individuals had a good or bad experience with remote learning and ultimately whether they are willing to try it again. The pandemic also uncovered vast inequalities between the learning environments, technology, and overall access available to students from low-income families versus high-income families. Students in less advanced economies reported less consistent access to technology and internet connectivity (Bacher-Hicks, Goodman, & Mulhern, 2020).

Post pandemic, there are the opportunities for remote learning in several ways: schools may continue to integrate learning to enhance in-classroom experiences; online learning may provide expanded access to different coursework to help personalize learning for each student; and even may help bridge future learning gaps due to natural disasters or other emergency closures.

Online grocery shopping. It is a way of buying food and other household necessities using a web-based shopping service. These items are purchased online. There are two main delivery methods: the items are delivered directly to one's home or the customer can pick them up at the store once an employee has assembled the order.

Before COVID-19, online grocery penetration remained in the low single digits across most geographies. China and the United Kingdom led with online sales of about 7.5 percent of total grocery sales in 2019 (). In the United States, 38 percent of millennials reported having tried online grocery as of 2018, more than double the 14 percent share of baby boomers (Statista, 2020). In Germany, 45 percent of millennials had experimented, versus 31 percent of the entire population (Mintel, 2016).

During the spring peak of the pandemic, as lockdowns, health fears and physical distancing extended from weeks to months, online grocery penetration doubled. For example, 7.5 to 13 percent in the United Kingdom in June 2020, 6 to 10 percent in France in April (Remes, et al., 2021). This expansion was driven mainly by first-time users, as restaurant and other business closures encouraged the online shopping. They tried online grocery because of necessity and found it both time-saving and convenient. On the other hand, grocers were forced to improve or acquire online capabilities to keep their businesses going. Yet, they were

also able to expand online grocery into previously less valued categories, notably fresh produce, as issues like produce quality and ability to select specific products were less of a barrier (Chang & Meyerhoefer, 2021). This period allowed companies and consumers to experiment with new online offerings.

Despite the rapid rise of online grocery shopping, low-income consumers remain at risk of being boxed out of the ecosystem. Moreover, for customers in countries with transportation problems, delivery is limited. Thus, delivery costs, lack of sales, and minimum order amounts for online shopping can be prohibitive for low-income shoppers and consumers of different geographical locations (McClements, et al., 2021). We can expect to find distinct country variations in the use of online grocery shopping. Increases in online grocery penetration are more likely to stick in urban areas of advanced economies, mainly because the nations' strong digital and delivery retail infrastructure. In other countries, online grocery might not efficiently pivot to manage the higher costs associated with delivery or from shifting to in-store pickup and limited feasibility of third-party players to offer cost-effective options.

For the online grocery shopping trend to stick after the pandemic will depend on shoppers needs and preferences, that range from buy-it-online and pick-it-up-in-the-store to bulk purchase time savings, to rapid delivery for small, immediate-consumption goods, and how much value they perceive in online shopping. It will also depend on the readiness of grocers to provide a range of formats and prices to meet different needs across incomes and geographies, as well as to establish efficient delivery relationships to support consumption.

4 Discussion

The accelerated adoption of digital technologies during the COVID-19 and the circumstances surrounding the post-pandemic recovery provide the need as well as the opportunity to understand and learn about how individuals, organizations and societies will transform digitally. As researchers approach such investigation, this section offers some important guidance. First select your philosophical stance. Is the purpose of the research to study the dynamic interactions between people, organizations, or societies, and technology over time? This is Orlikowski's (2009) *emergent-force* perspective. Or is the purpose to focus on how technology is intrinsic to everyday activities and relations in the post-pandemic era (Orlikowski's *entanglement-in-practice* perspective)? In either case, be clear about your conceptual guidance. Make sure that you have covered and reviewed the relevant literature. Define the boundaries of your study (even if you have no framework, no variables, no hypotheses). Clearly state your research question even if it is rather large. It is also crucial to provide a sensible theoretical basis even if you "preserve a high degree of openness to the field data and a willingness to modify initial assumptions and theories" (Walsham, 1993). Finally, I also caution researchers not to seek individuals, companies, and societies that simply are looking for the latest hot technology offering a quick payback. Instead, they should be committed and thinking about the broad strategic direction and how digital technology can help solve problems.

Another consideration is research methodologies. For those interested in studying the effects of technology on individuals, work systems and social structures, role theory may be especially useful. Role-based studies of how technologies alter work systems usually involve studying *in situ* performance. Cascio & Aguinis (2008) defined this construct as the specification of the broad range of effects—situational, contextual, strategic, and environmental—that may affect individual, team, organization, or society. Thus, it provides a richer, fuller, context-embedded description of the outcomes that researchers wish to predict, as well as insights about who interacts with whom, and potentially about what (Barley, 2015). To study how people play their roles, researchers need to document repetitive patterns of typical encounters. A method that facilitates this is dramaturgical analysis (Goffman, 1959; 1983). Relying on observations rather than interviews, dramaturgy highlights roles, scripts, interactions, and role relations, including those with whom users interact regardless of whether they also use the technology. Dramaturgy asks a simple question, namely, has the technology shaped role relations within the work system in which it resides? The combination of role theory and dramaturgical analysis allows researchers to address holistically yet systematically both social as well as material features of technology-based changes in work systems.

An additional methodological alternative for studying how technologies alter work systems is experience sampling (Beal, 2015). Experience sampling methods (ESM), a family of approaches, attempt to capture a wide range of each individual's experiences as they occur in daily life, as close to the moment that they occur as possible. Typically, ESM designs involve intensive, repeated assessments with brief intervals (e.g., several hours to a day, or even 1-2 weeks). Because ESM attempts to capture fluctuations in one's daily experiences, it is clearly a within-person process, but Beal (2015) has shown that ESM can also link to higher levels of analysis that are aggregated versions of individual-level variables, such as customer service

or store sales per work hour.

In thinking about methodological alternatives, however, researchers might have to adapt the ways in which they do research, with some traditional ways of accessing and analyzing data becoming complicated or being closed off. In my own work, I have replaced on-site field study with digital diaries, video walk-throughs, and social media communications. Questions of interest that the researcher needs to ask her-/him-self include, but are not limited to: How could I apply the tools and techniques traditionally used in my research to the current circumstances? How can tools and techniques used in crisis research be applied in the post-pandemic era to generate novel insights? How can I, whose research was interrupted by COVID-19, pivot toward new opportunities for the data already collected? How did this pandemic affect availability and quality of data? What of reliability, validity and generalizability? How can future research accommodate data collected during COVID-19? How do common social and economic responses to COVID-19 influence data collection and analysis? What opportunities emerge from these changes? Which past crises can we learn from and extrapolate data from to facilitate the COVID-19 recovery?

5 Conclusion

This paper offers three main contributions. First, it presents an up-to-date characterization of the accelerated adoption of digital technology that has taken place during the COVID-19 pandemic. To deal with the crisis, individuals, organizations, and societies relied and developed digital solutions quickly. However, they also adapted their behaviors, operating models, and delivered product and services to customers, employees, and citizens. Second, it interprets the progress, direction, and purpose of the current research related to digital transformation. Third, it illustrates the implications for future research at the crossroads between the COVID-19 recovery and digital transformation across multiple levels of analysis, including individual, organization, and society. Ultimately, the crucial issue to consider is not technology in and of itself; rather, it is how to create and use theory and research to deepen our understanding about the impact and implementation of new developments in the post-pandemic era. The objective is clear: Maximize the positive consequences for individuals, organizations, and societies and minimize the negative effects. This will be a stimulating and ongoing challenge for the field of strategy, management, and IS.

6 References

- Ackoff, R. L. (1961). Management misinformation systems. *Management Science*, 14, 4, 147-156.
- Andal-Ancion, A., Cartwright, P. A., & Yip, G. S. 2003. The digital transformation of traditional businesses. *MIT Sloan Management Review*, Summer, 34 - 41.
- Bacher-Hicks, A., Goodman, J., & Mulhern, C. (2020). Inequality in household adaptation to schooling shocks: COVID-induced online learning engagement in real time. NBER working paper number 27555, revised November.
- Baig, A., Hall, B., Jenkins, P., Lamarre, E., & McCarthy, B. (2020). The COVID recovery will be digital: A plan for the first 90 days. McKinsey and Company, May. <https://www.mckinsey.com/~media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/The%20COVID%2019%20recovery%20will%20be%20digital%20A%20plan%20for%20the%20first%2090%20days/The-COVID-19-recovery-will-be-digital-A-plan-for-the-first-90-days-vF.pdf>. Retrieved, April 20, 2021.
- Barley, S. R. (2015). Why the Internet makes buying a car less loathsome: How technologies change role relations. *Academy of Management Discoveries*, 1, 31-60.
- Beal, D. J. (2015). ESM 2.0: State of the art and future potential of experience sampling methods in organizational research. *Annual Review of Organizational Psychology and Organizational Behavior*, 2, 383-407.
- Bestsenny, O., Gilbert, G., Harris, A., & Rost, J. (2020). Telehealth: A quarter-trillion-dollar post-COVID-19 reality. McKinsey & Company, May 29. <https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/telehealth-a-quarter-trillion-dollar-post-covid-19-reality>. Retrieved on May 2, 2021.
- Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: Toward a next generation of insights. *MIS Quarterly*, 37. 2, 471-82.

- Brynjolfsson, E., Horton, J. J., Ozimek, A., Rock, D., Sharma, G., & TuYe, H. COVID-19 and Remote work: An early look at US data. NBER Working Paper No. 27344, June 2020.
- Cascio, W. F., & Aguinis, H. (2008). Staffing twenty-first century organizations. *The Academy of Management Annals*, 2, 1, 133-65.
- Cascio, W. F. & Montealegre, R. (2016). How technology is changing work and organizations. *Annual Review of Organizational Psychology and Organizational Behavior*, 3, 6, 349-75.
- Chang, H. & Meyerhoefer, C. D. (2021). COVID-19 and the demand for online food shopping services: Empirical evidence from Taiwan. *American Journal of Agriculture Economics*, 103, 2, March.
- DePhilippis, E., Impink, S. M., Singell, M. Polzer, J., & Sadun, R. (2020). Collaborating during coronavirus: The impact of COVID-19 on the nature of work. NBER working paper number 27612, July 2020.
- Dichev, C., Dicheva, D., Agre, G., & Angelova, G. (2013). Current practices, trends and challenges in K-12 online learning. *Cybernetics and Information Technology*, 13, 3, September.
- Digital Learning Collaborative (2019). Snapshot 2019: A review of K-12 online, blended, and digital learning. April. https://static1.squarespace.com/static/59381b9a17bffc68bf625df4/t/5cae3c05652dea4d690f5315/1554922508490/DLC-KP-Snapshot2019_040819.pdf. Retrieved on May 1, 2021.
- Gregory, R. W., Kaganer, E., Henfridsson, O., & Ruch, T. J. (2018). It consumerization and the transformation of its governance. *MIS Quarterly*, 42, 4, 1225-53.
- Gregory, R., Wagner, H., Tumbas, S., & Drechsler, K. (2019). At the crossroads between digital innovation and digital transformation. ICIS 2019 Proceedings.
- Goffman E. (1959). *The Presentation of Self in Everyday Life*. Garden City, NY: Doubleday.
- Goffman E. (1983). *The Interaction Order*. *American Sociological Review*, 48, 1-17.
- Handley, L. (2020). How China turned to telehealth during the coronavirus. CNBC, November 18. <https://www.cnbc.com/how-china-turned-to-telehealth-during-the-coronavirus/>. Retrieved on April 22, 2021.
- Hansen, R., & Sia, S. K. (2015). Hummel's digital transformation toward omnichannel retailing: Key lessons learned. *MIS Quarterly Executive*, 14, 2, 51-66.
- Henfridsson, O., & Bygstad, B. (2013). The generative mechanisms of digital infrastructure evolution. *MIS Quarterly*, 37, 3, 907-31.
- Huang, J., Henfridsson, O., Liu, M. J., & Newell, S. (2017). Growing on steroids: Rapidly scaling the user base of digital ventures through digital innovation. *MIS Quarterly*, 41, 1, 301-14.
- IDC (2019). Business will spend nearly \$1.2 trillion on digital transformation this year as they seek an edge in the Digital Economy. IDC Media Center, April 24. <https://www.idc.com/getdoc.jsp?containerId=prUS45027419>
- IQVIA Institute (2018). 2018 and beyond: Outlook and turning points. March. https://www.iqvia.com/-/media/iqvia/pdfs/institute-reports/2018-and-beyond-outlook-and-turning-points-institute-report.pdf?_=1620771099337. Retrieved on May 10, 2021.
- Koonin, L. M., et al. (2020). Trends in the use of telehealth during the emergence of the COVID-19 pandemic—United States, January—March 2020. *Morbidity and Mortality Weekly Report*, 69, 43, October, 1595-99.
- Lund, S., Madgavkar, A., Manyika, J., & Smit, S. (2020). What's next for remote work: An analysis of 2,000 jobs, and nine countries. McKinsey and Company, November. <https://www.mckinsey.com/featured-insights/future-of-work/whats-next-for-remote-work-an-analysis-of-2000-tasks-800-jobs-and-nine-countries>. Retrieved on May 3, 2021.
- Lund, S., Madgavkar, A., Manyika, J., Smit, S., Ellingrud, K., Meaney, M. & Robinson, O. (2021). The future of Work after COVID-19. McKinsey and Company, February. <https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19>. Retrieved on May 3, 2021.

- Lyytinen, K., Yoo, Y., & Boland Jr, R. J. (2016). Digital product innovation within four classes of innovation networks. *Information Systems Journal*, 26,1, 47-75.
- Kallinikos, J., Aaltonen, A., & Marton, A. (2013). The ambivalent ontology of digital artifacts. *MIS Quarterly*, 37, 2, 357-70.
- McClements, D. J., Barrangou, R., Hill, C., Kokini, J. L., Lila, M. A., Meyer, A. S., & Yu, L. (2021). Building a resilient, sustainable, and healthier food supply through innovation and technology. *Annual Review of Food Science and Technology*, 12, 1-28.
- McElroy, J. A., Day, T. M., & Becevic, M. (2020). The influence of telehealth for better health across communities. *Preventing Chronic Disease*, 17.
- McKinsey & Company (2018). Can IT Rise to the Digital Challenge? Digital McKinsey, October. <https://www.mckinsey.com/~media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Can%20IT%20rise%20to%20the%20digital%20challenge/Can-IT-rise-to-the-digital-challenge.pdf>
- Mintel (2016). Millennials lead the online grocery shopping revolution in Europe. September 19. <https://www.mintel.com/press-centre/retail-press-centre/millennials-lead-the-online-grocery-shopping-revolution-in-europe>. Retrieved on May 3, 2021.
- Montealegre, R. Iyengar, K., & Sweeney, J. (2019). Understanding ambidexterity: Managing contradictory tensions between exploration and exploitation in the evolution of digital infrastructure. *Journal of the Association for Information Systems*, 20, 5, 647-80.
- Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital innovation management: Reinventing innovation management research in a digital world. *MIS Quarterly*, 41, 1, 223-38.
- Odgers, C. L., Schueller, S., & Ito, M. (2020). Screen time, social media use, and adolescent development. *Annual Review of Development Psychology*, 2, 485-502.
- OECD (2020). Health at glance: Europe 2020 - State of Health in the EU cycle. November. <https://www.oecd-ilibrary.org/docserver/82129230-en.pdf?expires=1620773730&id=id&accname=guest&checksum=7C03882D1FDE2DE7D67492AC9C1CF5EE>. Retrieved on May 8, 2021.
- Orlikowski, W. J. (2009). The sociomateriality of organizational life: Considering technology in management research. *Cambridge Journal of Economics*, 9, 125–41.
- Remes, J., Manyka, J., Smit, S., Kohli, S., Fabious, V., Dixon-Fyle, S., & Nakaliuzhnyi, A. (2021). The consumer demand recovery and lasting effects on COVID-19. McKinsey Global Institute, March. <https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/the-consumer-demand-recovery-and-lasting-effects-of-covid-19>. Retrieved on Feb. 8, 2021.
- Rothbard, N., Beetz, A. M., & Harari, D. (2021). Balancing the scales: A configurational approach to work-life balance. *Annual Review of Organizational Psychology and Organizational Behavior*, 8, 73-103.
- Sayed, S.T., Gerber, B.S., & Sharp, L.K. (2013). Traveling toward disease: Transportation barriers to health care access. *Journal of Community Health*, 38, 5, October, 976-93.
- Sebastian, I. M., Mocker, M., Ross, J. W., Moloney, K. G., Beath, C., & Fonstad, N. O. (2017). How big old companies navigate digital transformation. *MIS Quarterly Executive*, 16, 3, 197-213.
- Sia, S. K., Soh, C., & Weill, P. (2016). How DBS Bank pursued a digital business strategy. *MIS Quarterly Executive*, 15, 2, 105-21.
- Statista (2020). U.S. Millennial shoppers who have used an online channel for groceries 2015-2018. November 30. <https://www.statista.com/statistics/513009/online-grocery-us-shoppers-by-generation/>. Accessed on May 3, 2021.
- Tabrizi, B., Lam, E., Girard, K., & Irvin, V. (2019). Digital transformation is not about technology. *Harvard Business Review*, March 13. <https://hbr.org/2019/03/digital-transformation-is-not-about-technology>
- Vial, G. (2019). Understanding digital Ttransformation: A review and a research agenda. *Journal of Strategic Information Systems*, 28, 118-44.
- Walsham G. (1993). *Interpreting information systems in organizations*. Chichester, UK: Wiley.

Woodard, C. J., Ramasubbu, N., Tschang, F. T., & Sambamurthy, V. (2013). Design capital and design moves: The logic of digital business strategy. *MIS Quarterly*, 37, 2, 537-64.

Yoo, Y., Boland, J. R. J., Lyytinen, K., & Majchrzak, A. (2012). Organizing for innovation in the digitized world. *Organization Science*, 23, 5, 1398-408.



Ramiro Montealegre:

Dr. Montealegre is an Associate Professor of information system in the Leeds School of Business at the University of Colorado, Boulder. He received his doctorate in business administration from the Harvard Business School in the area of management information systems. His master's degree in computer science is from Carleton University, Canada. He holds a Bachelor in Engineering degree from the Francisco Marroquín University, Guatemala. Dr. Montealegre's research focuses on the interplay between emerging digital technologies and organization transformation in highly uncertain environments.