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VIEWPOINT:

The Impact of Coronavirus on Service Ecosystems as Service Mega-Disruptions

Sertan Kabadayi, Fordham University, USA

Genevieve O'Connor, Fordham University, USA

Sven Tuzovic, QUT Business School, Australia

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Abstract

Purpose – This viewpoint article synthesizes the widespread economic impact of the outbreak of COVID-19 and presents a new concept, service mega-disruptions (SMDs), that refer to fast moving market disturbances at a massive scale caused by a pandemic. The purpose of this viewpoint article is to offer a framework to recognize the impact of SMDs on service ecosystems, and a call to action for service researchers in light of the COVID-19 outbreak.

Design/methodology/approach – The viewpoint presents an overview of massive market disturbances that we observe across multiple service sectors based on current news reports. It then develops themes for timely and actionable research for service scholars.

Findings – The outbreak of COVID-19 demonstrates that both service industries and the service research community face a new reality, something that we are not well-prepared to handle. A new framework is needed to understand the impact of such virus outbreaks, and current service marketing concepts need to be re-investigated from a new perspective.

Originality/value – This paper contributes to the literature and service research community by addressing the phenomenon of service mega-disruptions (SMDs) by curating a framework and collection of research themes to understand what we observe and what we need to learn to do better in the future.

Keywords – COVID-19, Coronavirus, Service mega-disruption, Service research themes, Pandemic

Paper type – Viewpoint

Introduction

COVID-19, an infectious disease caused by the recently discovered Coronavirus, was first detected in Wuhan, the Hubei Province of China, in December 2019. The virus is primarily spread through direct contact with an infected person (CDC, 2020) and can cause symptoms similar to the flu and the common cold (e.g., fever, cough, fatigue, and body aches) but is expected to be more deadly. In mid-January 2020 the spread of the virus escalated rapidly and on January 30, 2020, the World Health Organization (WHO) declared COVID-19 a global emergency.

Initially, the most concentrated outbreaks were in four transmission clusters: China (centered in Wuhan, Hubei Province), East Asia (South Korea and Japan), the Middle East (Iran), and Western Europe (Italy). However other countries quickly witnessed the spread of COVID-19, with the United States, Spain, Italy and France seeing the largest number of cases. With the global spread of this new disease, the WHO formally declared COVID-19 a pandemic on March 11, 2020. Many countries around the world still face exponential growth. According to latest news, it took 83 days to reach one million cases, and only two weeks to double this number globally. By the time this viewpoint was finalized, there were over 125,000 deaths and more than two million confirmed COVID-19 cases in more than 210 countries and territories around the world (for up-to-date data see the COVID-19 Dashboard by Johns Hopkins University, 2020).

While the virus outbreak is first and foremost a human tragedy, its economic impact is gravely concerning as well. Within only a few weeks of the outbreak, COVID-19 sent global economic shockwaves affecting stock markets, consumer confidence, and global supply chains. Travel and tourism have collapsed (Azevêdo, 2020). Concerns amongst consumers are growing and the decline in consumer confidence has prompted the OECD (Organization for Economic Cooperation and Development) to lower its forecast for global growth (Parsley, 2020). COVID-19 is expected to have a multiplicative and perhaps exponential impact on supply chains as

organizations face shortage or complete lack of supplies. Stock markets around the world have reacted to the COVID-19 pandemic with worrying volatility as a result of panic selling. The unpredictability of large drops has triggered four separate trading halts (i.e., pauses in trading to prevent stock market crashes) when the S&P fell by 7% after the market opened (Funakoshi and Hartman, 2020). The steep drops have been partially attributed to concerns over the economic damage from the spreading of COVID-19 to prompt selling in a wide range of assets. While some experts say we are already in a recession, the International Monetary Fund (IMF) forecasts in its April outlook that the global economy is expected to shrink by 3.0% making our economic future the worst recession since the Great Depression (Lawder, 2020).

Though governments and public health experts race to stop the spread of COVID-19, the question of “will the virus spread” rapidly changed to “how many lives and businesses will be severely affected”, prompting more questions than answers as “no one has a playbook for this” (Isaac *et al.*, 2020). Across the globe, individuals are rendered to quarantine or isolation, global travel bans are put into place, and businesses close their doors in response to the recent outbreak of COVID-19. For example, brick-and-mortar retailers and restaurants are dealing with the harsh realities of being placed under lockdown, as local governments enforce quarantine measures to enforce social distancing and restrict unnecessary trips outdoors. Witnessing the second largest outbreak of COVID-19 after China, country-wide lockdowns have been enforced in countries all around the world, a quarantine measure to contain the outbreak.

As the world combats COVID-19, no area of life is unaffected as stay-at-home orders (e.g., North America) or movement control orders (e.g., Southeast Asia) are implemented to keep residents at home except for essential tasks (e.g. grocery shopping) or essential work. Initially, some stores had voluntarily closed their doors, but as the spread of COVID-19 continued, states and countries issued emergency orders forcing businesses to close. As the outbreak of COVID-19 has surged through the world, affecting millions of people, the service sector is among the hardest hit by lockdown measures. For example, retailers, bars/restaurants, and hotels are forced to close, rendering many unemployed. Small and medium-size retailers are being hit particularly hard as they do not have the resources to weather the economic shock. To further complicate matters is the big cloud of uncertainty that hangs over the world. While some industries like the airlines are suddenly facing an overcapacity problem caused by severely limited air travel, cancellations, and travel bans, some other industries like healthcare are stretching their limits to

handle the sudden increase of patients. On the other hand, more and more schools and higher education institutions all over the world have cancelled their in-person classes, switching to different modes of distant course delivery almost overnight. Table 1 presents an overview of massive market disturbances that we observe across multiple service sectors based on current news reports.

(Insert Table 1 about here)

When considering how a fast-moving disturbance simultaneously impacts essentially every industry across the globe, which is further compounded by multiplicative effects between industries, it is clear that the service industries in general and the service research community are facing a new reality, something that they are not well-prepared or even possibly equipped to handle. The purpose of this viewpoint article is first to offer a new concept called *Service Mega-Disruptions* (SMDs) and define its characteristics¹. Then, it presents a framework that summarizes the impact of SMDs on service ecosystems and offers a call to action for service researchers in light of the COVID-19 outbreak.

A New Phenomenon: Service Mega-Disruptions (SMDs)

In the past, we witnessed various examples of company- or service industry-specific mass disruptions and/or outages due to weather events and natural disasters (e.g. earthquakes, tornados). For example, telecommunication and Internet service providers refer to a “mass service disruption” when normal operations are significantly disrupted by circumstances beyond the firm’s control (Optus, 2020). However, the phenomenon we are now observing is different in the sense that it is not just one company or country/region being affected by the outbreak of COVID-19. In fact, COVID-19 simultaneously affects numerous service industries all over the world as shown in Table 1.

¹ This pandemic has undoubtedly created an unprecedented impact on every industry and market including manufacturing sectors and financial markets. However, given its major blow to service economies and the scope of this journal, our conceptualization is focused on Service Mega-Disruptions. Future studies may want to consider overall Market Mega Disruptions or disruptions in other specific contexts.

In this viewpoint article, we propose the novel concept of *service mega-disruptions (SMDs)*. We define SMDs as unforeseen service market disturbances caused by a pandemic. Unlike a regular service disruption, SMDs occur on a massive scale affecting multiple stakeholders and service ecosystems simultaneously which cannot be easily recovered from.

Below we describe four key components of SMDs:

1) A service market disturbance on a massive scale

SMDs are massive in scope, meaning that their effects are not limited to one or a few industries or geographic regions. For example, SMDs can induce a sudden drop in demand for some services that results in underutilization, i.e. airline/travel industry, or by a sudden peak in demand that results in failure to meet such demand, i.e. healthcare industry. These massive disruptions simultaneously affect numerous industries across the globe, irrespective of city, country, or region. Undoubtedly, industries impacted most are within countries or regions directly exposed to SMDs, but multinational organizations operating globally across regions bear the effects as well. For example, COVID-19 has led to service disruptions across a multitude of service organizations in a variety of service sectors where services cannot be delivered or delivered in the traditional way. Organizations are forced to seek new ways to meet their customers' needs. For example, within both higher education and healthcare, both educators and service providers are connecting with students and patients digitally (e.g. online learning, digital health). Furthermore, in such mega disruptions, industries that are directly or somewhat related to each other create spillover/snowball effects that impede service delivery. For example, COVID-19 has led to a sharp decline in airline travel which in turn has impacted hotel stays.

2) Caused by an unforeseen pandemic

Service disruptions or failures can be caused by many reasons such as employees' performance or a company's lack of technological infrastructure. A larger scale service disruption could also happen because of natural or weather-related disasters like an earthquake or a hurricane. For example, in the days following an earthquake, many service organizations within the given area are unable to perform and provide services. In such cases, organizations and employees are often caught unprepared and ill-equipped to handle challenges they face, especially given the scale of those challenges. Case in point, even though the seasonality of hurricanes is expected

(i.e. hurricane season), and some service providers take necessary precautions to lessen the negative impact of such events, no one was truly prepared for Hurricane Katrina, the second most intense storm to hit the United States in 2005. However, SMDs are different in nature as they are caused by a global pandemic. The major difference between SMDs and other larger scale service disruptions (such as those caused by earthquakes) is that the virus spreads quickly, unknowingly, and globally. There is no natural disaster that could, or even has the potential to, simultaneously affect billions of people in a very short period of time. Coupled with the fact that such virus outbreaks are usually unforeseen and spread very quickly, they create massive disruptions with a global impact in a short period of time. In such unexpected outbreaks, like the latest global COVID-19 case, service providers are caught totally unprepared and left frantically seeking solutions. Key differentiators of COVID-19 are that no one knows how “bad it will be”, nor how many lives or businesses will be affected, nor how long the recovery will be.

3) Affect multiple stakeholders and service ecosystems simultaneously

SMDs not only negatively affect customers and employees in a service interaction, but also create challenges at multiple levels (i.e., micro, meso, and macro) by hurting individuals, companies, communities, and societies simultaneously. Service literature has introduced the concept of a “service ecosystem”, which studies the interaction and exchange of service among various stakeholders and emphasizes the role of institutions in value creation (Akaka *et al.*, 2013; Kaartemo *et al.*, 2017). By nature, service ecosystems are multilevel, where each level (i.e., micro, meso, and macro) is embedded and interdependent, as various actors interact with each other and integrate resources to co-create value (Beirão *et al.*, 2017). The COVID-19 outbreak highlights the interdependence of multiple stakeholders and service ecosystems (e.g., global supply chains, global travel and service trade, global education), from nations and economies (macro level), to service industries such as restaurants, retail and healthcare (meso level) to the individual consumer and employee (micro level). The deleterious effects of SMDs are even more pronounced the more service ecosystems are interrelated, i.e., multiple industries influence service production and delivery (Akaka *et al.*, 2013; Kaartemo *et al.*, 2017). For example, airports offer both aeronautical (i.e., travel facilitation) and non-aeronautical services (e.g., restaurants, retail stores, interactive exhibits). After the COVID-19 outbreak airports have been feeling the ripple effects of global travels bans and lockdown measures (macro level), which has

led to airlines grounding entire fleets and parking them on the tarmac (meso level). As airports are hit with revenue losses they still are required to operate, for example, for repatriation flights. Yet, passengers, flight attendants, and ground crew such as baggage handlers may be exposed to the virus and endanger their health and wellbeing (micro level).

Given this background and examples, we need to consider how SMDs affect relationships within a service ecosystem (e.g., healthcare services) and consider interdependent relationships between different service ecosystems (for example, how to achieve ‘flattening the curve’ by healthcare providers, regulating agencies, and individuals). We further need to recognize that these effects are felt on a global scale, they are not limited to a specific country or region. Almost no region, country or city remains untouched or unaffected by SMDs, as is the case with COVID-19, where currently each continent aside from Antarctica is directly affected by the spread of virus. Furthermore, due to the economic and humanitarian crisis created by SMDs, almost every industry feels the effects in one way or another.

4) Not easy to recover

Pandemics, by definition, create a long-lasting impact on human lives and economies. We can learn about the potential aftershocks of COVID-19 and the difficulty of recovery from it by looking at some of the most recent pandemics. While the Spanish flu in 1918 was a major tragedy in terms of human lives lost (e.g. Olsen and Zamora, 2020), it would be hard to compare the COVID-19 pandemic to the Spanish flu because the pandemics were so different, certainly in terms of time but also in terms of the economic and socio-cultural differences between the two time periods (Newman, 2020). Another pandemic to be potentially considered is HIV which started in the early 1980s and claimed more than 32 million lives. However, unlike COVID-19 the means of transmission for HIV is not via coughs and sneezes and its economic impact has been limited compared to other pandemics (Newman, 2020). On the other hand, the Swine flu (H1N1) pandemic that occurred between April 2009 and August 2010 would be a more appropriate comparison to understand the impact of COVID-19. The Swine flu affected an estimated 60 million people over a timeframe of 16 months with around 275,000 hospitalizations and over 12,000 deaths (Newman, 2020). In terms of the Swine flu’s impact on businesses around the world, it is considered to have been mild, with some estimates predicting that it cost the U.S. economy around \$700 billion in productivity (McKibbin, 2009), a much smaller amount

given the financial cost of the current epidemic. While the Swine flu was still a major human loss, the impact of COVID-19 in terms of human loss and suffering has already been much higher within a few months. Unlike earlier pandemics and epidemics that led to short-lived spikes in volatility in financial markets, COVID-19 had an impact on businesses around the world and created a sizeable contribution to global financial market volatility and loss (Baker *et al.*, 2020). Finally, unlike the Swine flu which created economic damage for some select group of countries like South Korea and Mexico in limited industries (Kim *et al.*, 2013), the current pandemic has affected every single country around the world in healthcare services, tourism, hospitality, and manufacturing to name a few.

It is evident from the historical data that economic recovery from earlier pandemics were challenging and took at least a year or two for many individual companies and industries (McKibbin, 2009). Therefore, it is quite plausible that given its complexity, scale, geographic size, and the number of stakeholders affected, it is going to be extremely difficult for many individual service providers and industries to recover from the effects of SMDs as created by COVID-19. Such recovery will take a long time, but will also require joint efforts from industry, governments, and international organizations. In some cases, one would even expect that individual firms and even industries cannot fully recover from SMDs by themselves without some form of government support and bailout. Still, it might be impossible for individual firms to recover from irreversible effects, as bankruptcies will make it impossible for an organization to fully recover.

A Framework for the Impact of SMDs on Service Ecosystems

Based on the evidence and examples provided in news and reports to date, and our own interpretation of that evidence, we propose a framework for the impact of SMDs on service ecosystems (see Figure 1). This framework proposes that SMDs have simultaneous effects on various actors at micro, meso and macro levels of a service ecosystem that force service organizations to change the way they deliver services. More specifically, those SMDs have an impact on customers and employees at the micro level by creating disruptions of demand and capacity; on service and public service industries at the meso level by disrupting how services are created and delivered; and on government actions and policies at the macro level.

Furthermore, grounded in this framework, we identify five broad research themes for service researchers to study and help all of us better prepare for SMDs in the future.

(Insert Figure 1 about here)

Micro level: Customers and Employees

Given that SMDs are caused by a fast spreading virus or bacteria, they affect both parties in a service interaction, i.e. customers and employees. First, SMDs create *safety and wellbeing concerns* for both employees and customers. In fact, as these concerns suddenly became a global priority, a chain reaction of negative responses were triggered. For example, the worldwide reports accounting for the number of infected people and number of casualties instilled a fear for many individuals. Coupled with this fear is the pressure to ensure the safety and health of themselves and their loved ones, leading to anxiety and panic. Given that some groups are more vulnerable to this virus only intensified such emotions. Globally, *social distancing* has been recommended, and more often mandated by government and public health officials, as a measure to stop or slow down the spread of this highly contagious virus. While social distancing measures are thought to be helpful in the fight against COVID-19, in some cases such social distancing has led to feelings of isolation and loneliness by some individuals, further increasing their anxiety and panic. All of these factors result in *disruption of demand* for many services.

On the other hand, from an employee perspective, social distancing from customers creates further problems. Many service organizations are looking outside of the traditional ways of how to deliver their service to meet the demand of their customers. For example, many schools including colleges and universities had to move from in-person to online classes over a very short period of time. In many cases, service employees are forced to deliver their services at a distance. The issue becomes more problematic for high-touch, people-intensive services; from a haircut and massage to hospitality and tourism. The urgent need to adopt to this new reality and to change the way they do business, coupled with the possibility of losing their jobs due to decreasing demand undoubtedly has created feelings of stress and overburden for these employees, in addition to their personal concerns of their safety and well-being. All of these factors lead to *disruption of capacity* on the employee side, as such stress and anxiety negatively affect their job motivation and performance.

Meso level: Service Industries and Public Services

By definition, SMDs negatively affect many industries simultaneously. In the current case, COVID-19 is nearly devastating many service industries including transportation, travel and hospitality, retail and entertainment among others. For example, airlines, hotels, car rental agencies, etc. were among the first to feel the effects of COVID-19. First, many customers reduced their personal travel amidst fears of catching the virus while travelling either during a flight or staying at a hotel. Then, business travelers reduced their travel as companies' increasingly limited travel for their employees and turned to the model of working remotely. In tandem, the cruise liner industry continues to suffer, due to the well-publicized cases of cruise ships (first in Japan and then in the United States) reinforcing the idea of "getting stuck" with thousands of people, including those infected with the virus. Finally, the U.S. government's unilateral travel ban for non-U.S. citizens from many European countries is prompting major financial losses for airline companies. In Australia, Qantas and Virgin have grounded 90-100 percent of their international fleet. Furthermore, with the rising concern over the spread of virus, individuals are keeping their distance. This practice of social isolation is creating *over-capacity and under-demand* situations which are collectively hurting entertainment, dining, and retail businesses.

In the domain of public services, many challenges, albeit in somehow different forms, have been experienced. First, the increasing demand for healthcare and other related emergency services created by the multitude of cases of infected individuals in over 200 countries has put a major strain on the delivery of healthcare services. In many cases, hospitals do not have enough beds or medical supplies to provide care to those who need it. Additionally, with the possibility of doctors, nurses and other healthcare providers getting infected, limited human capacity of healthcare services poses a risk of *under-capacity* and *over-demand* for those services. In terms of education services, many schools have converted their face to face classes to different types of distant and online learning modes over a very short period of time. Another example of an *over-demand* and *under-capacity* situation is being witnessed within academia. Given that many faculty members have little-to-no experience with alternative distance learning teaching tools has created a need for extra training requiring additional support staff to help them adjust to the new environment.

Macro level: Government actions and policies

Understandably, governments are under great pressure to handle the crisis caused by COVID-19 and subsequent SMDs. While some governments have been criticized for being slow to respond to this crisis, eventually all governments across the globe have taken serious precautions to reduce the speed of virus infection. Such precautions started with the isolation of individuals who are either infected or exposed to the virus followed by travel restrictions between certain destinations in the areas of the world affected by COVID-19. To further contain the spread of the virus, governments imposed different degrees of lockdowns, first in some cities and towns (e.g., Wuhan Province, China, municipalities within the province of Lodi, Italy, and New Rochelle, New York) and then in an entire country (e.g., Italy). According to the Pew Research Center, approximately 93% of the world's population live in countries with COVID-19 travel restrictions, with approximately three billion individuals living in countries that have complete border closure to foreigners (Connor, 2020). While these government actions and policies aim to help keep their citizens stay safe and healthy, they undeniably have many negative effects on service industries across the globe. Therefore, any efforts to understand the effect of COVID-19 or other SMDs on a service ecosystem cannot be separated from understanding the role of government actions and policies.

Themes for Future Research

While the entire world is desperately trying to find ways to get out of this present pandemic and work on recovery measures, some experts have already talked about the possibility of having multiple waves of this same pandemic or other pandemics created by a different virus in the near future (Knowles, 2020). Therefore, there is clearly a need for more service research around this timely topic². We identify and propose five main research themes prompted by SMDs and the framework developed in this paper. Given their overall scope and target, the first theme (a) is focused on the macro level, while next two (b and c) are focused on the meso level, and the final two (d and e) are related to the micro level in our framework.

² Please see Emerald Open Access call for papers on the Coronavirus here: <https://www.emeraldpublishing.com/coronavirus/>

- a. ***Service Ecosystem Recovery:*** Extant literature shows that service failure and recovery have been investigated in numerous studies. Those studies focus on specific strategies service organizations can implement to recover from service failures. However, given the massive size and scope of SMDs, the existing service recovery efforts we have today are simply not sufficient to deal with the overall and interactive effects of SMDs. Therefore, there is a need for new research on well-coordinated global recovery efforts engaging multiple stakeholders. For example, research needs to examine whether organizational service recovery efforts are sufficient or if there is a need for industry-based recovery efforts to help all individual companies and customers affected in a specific industry. Also, it would be interesting to examine how service organizations recover from challenges created by government mandated lockdowns and quarantines and how consumers respond to those recoveries.

- b. ***Service Agility and Transformation:*** Agility refers to an organization's ability to renew itself, adapt, change quickly, and succeed in a rapidly changing, turbulent environment (Handscomb and Thaker, 2018; Teece *et al.*, 2016). The world's experience with COVID-19 has underlined the significance of agility to help service organizations respond swiftly and efficiently to the fast-changing environment created by SMDs. While there has been academic research around the topic of organizational agility (e.g. Teece *et al.*, 2016), there is a clear need for more specific research on service agility and transformation tailored to SMDs. For example, what factors contribute to service organizations' ability to move quickly to respond to SMDs? How can service business models be transformed to help organizations be better prepared for SMDs? Additionally, organizations' transitioning from face-to-face to virtual meetings highlights the importance of employees being able to adapt quickly; therefore future research should focus on employee training and performance in terms of service agility.

- c. ***Service Technology and Automation:*** Over the last two years the service research community has increasingly addressed the topic of service robots, for example, at international conferences and in academic publications. With COVID-19, we are witnessing various uses of service robots and other innovative technology-based

solutions to manage the challenges created by SMDs. However, little is known as to how and when service companies' adopt technology and automation in response to SMDs such as COVID-19. Another interesting service area to consider is how changes to mode of service delivery will affect service employees, customers and the interaction between the two. Further, research should examine proprietary issues that arise from service companies who share their technology and knowledge to help with the global effects of SMDs.

- d. **Remote Service Provision:** Though distant or remote service delivery has already been used in some service industries, the increasing practice of social distancing as well as mandatory shutdowns and isolations, has left many organizations relying on remote service provision. Remote service provision on such a large scale presents research questions across stakeholders. For example, how can service providers deliver or modify their services to those in quarantine? Also, examining what services can still be delivered during such lockdowns with some minor adjustments and what services would require major restructuring and redesign would provide answers for practitioners. For example, can education/classes and even some forms of healthcare still be delivered remotely through technology and online delivery? Nevertheless, some other types of services cannot be delivered as they may require either travel to the service provider in the case of hotels or restaurants, or person-to-person interactions such as haircuts or massages. Therefore, future studies may try to develop a classification of services for SMDs in terms of their delivery modes. Further, we need to better understand how to best use remote services in response to SMDs. Such as – is mandating remote learning for school age children the best way to educate or would children be better served if schools extended the school year? Finally, there is a need to study how remote service provision would change customer experiences with services and service employees.
- e. **Service Theory of Social Distancing:** Social distancing, refraining from close contact with others, is used to minimize the spread of a pandemic. While its implications for service delivery needs to be understood, there is also a need for a theoretical examination of social distancing. For example, how does the interaction between different actors change in a service provision characterized by wide-spread social distancing during

SMDs? How does it affect value co-creation? How will experiences change when customers are mandated to engage in social distancing rather than opting it for themselves? Service researchers need to analyze many well-accepted service-related concepts, frameworks and theories through this new lens of mandated social distancing.

Conclusions

The pandemic caused by the COVID-19 virus has created an unprecedented impact on humanity. In addition to the heartbreaking human loss and suffering, this pandemic will have long-term consequences for the global economy and businesses due to the expected recession. While no industry or company will remain untouched by this pandemic, this viewpoint focuses on the impact of COVID-19 on service ecosystems and organizations. More specifically, we propose that Service Mega-Disruptions (SMDs), a new phenomenon created by this pandemic, will create challenges for various actors at all levels of service ecosystems, i.e., micro, meso, and macro levels. The framework developed in this viewpoint suggests that a holistic multi-level approach is needed to fully understand the impact of SMDs. We strongly believe that having such understanding would help with much needed recovery efforts for service organizations moving forward. Furthermore, this framework offers five specific research themes for service researchers to better understand the implications of the post-pandemic reality for service organizations. These themes and relevant research questions could be a starting point for service researchers in their quest for answers.

In addition to all of these unprecedented challenges, the massive disturbances caused by COVID-19 to the service industry offers an opportunity for academics and practitioners alike to learn what worked and what can be done better. This pandemic demonstrates that the service industry needs to be more flexible and to be more agile in a world with so many unknowns. As of this writing, we can neither foresee the human impact nor the economic impact, as infections of COVID-19 continue to rise globally and global markets and industries remain in turmoil. However, there are some important lessons to be learned.

Through our collective experience we learned that the world in general, and service organizations in particular, need to be better prepared for SMDs. That preparation includes having back up measures in place to ensure service continuity. Similar to having a generator in place for an electrical outage, service organizations across the globe need to have protocols and

resources in place to ensure business will continue as close to normal as possible. To that point, training should be provided in advance for employees, and in some cases for customers as well. For example, within education, educators need to be prepared to deliver material online and students need to know how to access the material. COVID-19 may also prompt organizations to become more serious about conducting day to day business remotely and invest more resources to do just that.

With a pandemic like COVID-19, we are recognizing the importance of good hygiene and social distancing. Hospitals, schools, and even mass transportation vehicles are witnessing a sharp increase in deep cleaning to help fight the virus. Given the most emphasized precaution against the spread of COVID-19 is washing hands, many service organizations need to focus on the importance of both employee and customer personal hygiene for the continuity of their operations. Similarly, companies need to find ways to practice social distancing while delivering their services. For example, amid concerns of possible food contamination due to food delivery, contactless pickup and delivery services are being employed. Companies like McDonald's and Starbucks are using delivery services that limit human-to-human contact, and orders are carefully packaged to keep them free of contamination. Similarly, to minimize human-to-human contact in e-commerce delivery, some companies are experimenting with end-to-end "contactless" solutions using unmanned vehicles and drones. Similarly, some hospitals are also using robots to guide patrons to transport medical supplies within their facilities. While such technology has already been available for companies, the challenge has been to get companies to use it- that is until now.

Additionally, we learned that flexibility and agility is critical for service organizations during and after SMDs. With the fast-changing nature of SMDs and their overall scope and impact, service organizations need to respond quickly- as delayed response could be a matter of life or death, both figuratively and literally. For example, organizational ability of healthcare providers to respond to fast-changing reality in real time could be critical in handling the damage created by SMDs. Similarly, the recent COVID-19 case has shown us the importance of decision-making speed and quality for some critical industries like senior housing and care facilities. Such agility and flexibility could help service organizations discover innovative solutions to reduce the suffering created by SMDs. Further, timely communication with existing and potential customers are critical during such times. Many service providers (e.g., UBER,

Delta Airlines, and Hilton Hotels) exhibited timely and transparent practices by proactively contacting customers to provide detailed information about their efforts to deal with the existing crisis.

Finally, SMDs remind us of the importance of collaborations and partnerships between service organizations and other actors at different levels of an ecosystem such as governments and other organizations across different industries. For example, COVID-19 has highlighted the importance of having a strong healthcare system and objective news agencies. Clearly, we learned that a holistic approach is needed to provide the relief and assistance needed during and after SMDs.

We strongly believe that service organizations will play a critical role in collective recovery efforts from this pandemic and preparations to minimize the impact of possible pandemics in the future. We hope that challenges included in the framework, and the subsequent research themes identified in this viewpoint will provide an initial blueprint for service researchers and practitioners in such efforts.

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Table 1: How COVID-19 influences global service markets

Service sector	Examples of market disturbances
Air cargo and global shipping	<ul style="list-style-type: none"> • Air cargo freighter operators have canceled operations beyond normal holiday time frames due to low demand for air cargo capacity. • Global shipping companies such as Maersk, MSC Mediterranean Shipping, Hapag-Lloyd and CMA-CGM that carry goods from China to the rest of the world reduced the number of seaborne vessels to stop the spread of COVID-19.
Aviation	<ul style="list-style-type: none"> • Countries (e.g. Australia, the U.S.) introduced travel bans. First this affected travelers from China, followed by South Korea, Iran and Italy. More recently Israel expanded travel bans to other European countries including Germany, France, and Spain. The U.S. implemented a 30 day travel ban on all non-residents seeking to come to the U.S. • Travel restrictions and a lack of demand from customers have encouraged airlines around the world to cancel flights (Riley, 2020). For example, Lufthansa cut 1,700 flights until the end of March, which is equivalent to reducing its capacity by 150 planes. • According to the International Air Transport Association (IATA), global airlines are expected to lose \$113 billion in sales if COVID-19 continues to spread.
Cruise ships	<ul style="list-style-type: none"> • Several cruise operators experienced massive disruptions of their operations as passengers on cruise ships were stuck for weeks onboard. • Cruise operators face a surge of cancellations at the start of the busiest season. • Carnival Cruise Lines, Norwegian Cruises, and Royal Caribbean Cruises all together recently announced they canceled nearly 40 cruises and rerouted over 40. • Cruise company stocks took a nosedive amid the CDC and the U.S. State Departments recommendation to travelers to defer cruise travel at this time.
Education	<ul style="list-style-type: none"> • Chinese students face travel restrictions to Australia. As a result, Australian universities started to develop contingency plans to deliver content online to Chinese student cohorts who are not able to enter the country. • Schools and universities worldwide are shut down. More than 300 million students globally have been affected, promoting schools to prepare educators and students to continue coursework remotely.
Energy	<ul style="list-style-type: none"> • S&P energy sector lost approximately a quarter of its value in three days, the worst three day stretch on record, in response to fears of COVID-19 and oil price wars.

Entertainment	<ul style="list-style-type: none"> • It was announced that the new James Bond premiere is postponed to November 2020. • CBS temporarily suspended the production of its show ‘The Amazing Race’ on the upcoming new season.
Events	<ul style="list-style-type: none"> • Sporting events, music festivals, conferences, and trade shows are being canceled to prevent a further escalation of the virus outbreak.
Healthcare	<ul style="list-style-type: none"> • Several countries report that health practitioners have been infected by COVID-19. • In many countries, including the U.S., the number of tests and hospital capacity have been proven inadequate to handle the increasing number of cases.
Hospitality	<ul style="list-style-type: none"> • Many restaurants in major cities in China (e.g. Shanghai, Macau, Guangzhou and Hong Kong) and in Italy were ordered to close completely for several weeks. • The number of people dining out has dropped drastically due to social distancing measures. • The cancellations of hotel rooms have increased exponentially due to limited travel and travel cancellations.
HR / Workplace	<ul style="list-style-type: none"> • Some firms have started to ban face-to-face job interviews in favor of interviews conducted by teleconference. • Globally, employees in a number of companies are urged (and often required) to work from home for several weeks.
Retailing	<ul style="list-style-type: none"> • As a result of consumers ‘panic-buying’ retailers worldwide are taking drastic action to limit the number of products each person can buy as customers stockpile goods over COVID-19 fears. For example, Costco Australia capped sales of toilet tissue, disinfectant, milk, eggs and rice; Kroger is restricting purchases of cold and flu-related products and Home Depot of face masks in the U.S.; in the UK pharmacy Boots is limiting hand sanitizer purchases. • Some customers refuse to buy clothing due to their fear of getting infected by the virus through clothing items that were touched or tried on by others • Governor Cuomo of New York responds to the lack of hand sanitizer by using prison labor to manufacture its own.
Tourism & business travel	<ul style="list-style-type: none"> • Many companies (e.g. CNN, Citigroup, JPMorgan Chase, Walmart in the U.S.) have tightened travel restrictions for all employees to only essential travel.

Sources: Assis, 2020; Bates, 2020; Brett, 2020; Cheung, 2020; CNN, 2020; Gonzalez, 2020; Hatch, 2020; Hu, 2020; Isaac et al., 2020; Miranda, 2020; Paris and Sebastian, 2020; Parsley, 2020; Riley, 2020; Ziady, 2020.

Figure 1: Framework for the Impact of Service Mega-Disruptions

