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What has changed? The Impact of Covid Pandemic on the Technology and Innovation Management Research Agenda

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Introduction

Whereas the pandemic has tested the agility and resilience of organizations, it forces a deeper look at the assumptions underlying theoretical frameworks that guide managerial decisions and organizational practices. In this commentary, we explore the impact of the Covid-19 pandemic on technology and innovation management research. We identify key assumptions, and then discuss how new areas of investigation emerge based on the changed reality.

Organizational Design and Work Practices

The forced move to “working from home” (WFH) that the pandemic created is perhaps the most significant organization design shock of our lifetimes. While remote work was a feature of multinational firms and open source communities among others, the pandemic effectively forced “all remote all the time,” resulting in a scramble to adapt to remote collaboration and its technological infrastructure. Whereas the data to assess its effectiveness has yet to be gathered, we know that many assumptions about what was feasible in a distributed setting already stand falsified. As data accumulate on this dramatic regime

change, research into the particular combinations of tasks, people and infrastructure that enable organizations to work in distributed forms is bound to gather steam.

Does remote collaboration require modularization of work? The common intuition is that it does, since electronic interaction has low media richness. Therefore, if workflows cannot be modularized, face-to-face (F2F) coordination becomes necessary per this logic. However, a distinct approach based on asynchronous tacit coordination may be a viable alternative (Srikanth and Puranam, 2014). We expect that the asynchronous coordination practices that are the backbone of software development, whether in open source (Linux) or for-profit contexts (e.g. GitLab) will become of broader interest. These allow complex interdependent work to be executed in a distributed context, with coordination relying not on video calls (“seeing the face”) but rather on mutual observability of work (“seeing the work”) through code repositories and systemic procedures for ensuring compatibility (e.g., the “Git” process or continuous integration technologies).

This third path to coordinating work that relies neither on reducing interdependencies through modularization nor on real time interaction and communication may have broader applicability than previously considered. Further, does WFH increase the importance of managerial monitoring and control technologies? If monitoring is expensive, basic organization design principles suggest a switch from behavioral to outcome-based control (Puranam, 2018). The digitalization of work may make the latter more feasible than ever, allowing workers to be evaluated on results, not behaviors. At the same time, digital technologies can enable intrusive surveillance, creating a managerial Panopticon.

Collaboration, Creativity, and Innovation

Collaboration and communication drive innovation behavior. Will creativity suffer as a consequence of WFH? The antecedents of creativity in virtual teams remain largely unexplored (Gilson et al. 2015). There is little doubt that F2F interaction plays a positive role

in group level creativity, but what is unclear is how much of that can be replicated or bettered in online contexts. Could conformity pressures that induce groupthink be less prevalent in virtual groups? Can rapid iteration and prototyping with boundary objects be feasible online? Will collaboration patterns change in terms of co-producers of knowledge? Virtual work might nudge individual exploration patterns such that the locus of search shifts from co-located offices to geographically distant colleagues.

At the same time, there are concerns on virtualization of work. How do we onboard new members of an organization? In particular, how do we build new scientific and technology teams from members who may have never met in the physical world? If innovation is predicated on mutual knowledge among collaborators occupying various structural positions within a network of scientists experimenting with different technology components (Schillebeeckx, Lin and George, 2019), does the network structure change with virtualization or does experimenting with technology components become more (or less) radical if social interactions are reshaped? Daily working routines in which scientists have been embedded in for decades are disrupted, would this manifest in subtle shifts in the types of problems that individuals choose to solve, and how do these, in turn, affect the broader progress of science? Team dynamics and the implications of virtualization on collaboration and creativity will become increasingly important for innovation research.

Social Contagion, Digital Transformation and Speed of Adoption

The viral contagion has also created a social contagion in terms of technology adoption behaviors. From a firm-level perspective, Covid is credited with a fundamental transformation of the digital infrastructure of business. The pandemic has hastened the adoption of digital technologies and cloud applications in terms of delivery of core businesses. For example, contactless technologies, digital money and cashless payment systems have all become pervasive in their rollout. Across all sectors, digital transformation

is in progress at a pace never seen before. Do all businesses become digitally-enabled? What does this adoption mean for new business models or for social inclusion, and are we exacerbating the digital divide with the disenfranchised members of the community? Does time compression mean that we overlook important issues? For instance, the “Trace and Test” apps to track infections could reflect a shifting emphasis of collective good over personal privacy, and a greater willingness to cede power and control to government. These large-scale adoption behaviors could mark fundamental changes in attitudes of society and reflect a renegotiated equilibrium on the role of technology and government in our daily lives.

Research Infrastructure for Innovation

The vast majority of innovation infrastructure cannot yet be virtualized. While a lot of emphasis is on service sector innovation, there appears to be a declining interest in the large physical infrastructure required to make scientific breakthroughs. We know little about the implications of forced virtualization for the design of large, integrated labs. What will happen to the conduct of “big science”? Will this pandemic make us redesign how we conduct large experiments to push the frontiers of science? For example, drug development (other than Covid) has taken a backseat, clinical trials of new life saving medicines have been indefinitely postponed. What are the upstream implications for scientific talent? Do we need more scientists or fewer? Would certain scientific or innovation domains become more important due to flows of investment capital and managerial attention? The physical infrastructure required for innovation has been the dominant model for over a century. The pandemic raises questions on the conduct of science and discovery and how innovation infrastructure, including labs, buildings, and social ecosystems, might change.

Industry Disruption and Emergence of New Technologies and Business Models

The impact of Covid has not been uniform across industries. In some, including the educational sector, we are seeing a flurry of innovations with new business models that finally take online education, and its variants seriously. In others, such as hospitality and tourism, the outlook appears bleak. Has Covid accelerated the demise of certain industries or hastened the emergence of nascent industries? What factors allow us to predict the changing consumption patterns and emergence of new business models, as well as the demise of older ones, that underlie these processes?

Will the data evolution that was gathering steam come to an abrupt halt as machine learning enthusiasts discover that their training data from the pre-Covid era is simply non-representative of today (Iansiti and Lakhani, 2020)? Or will the enhanced digitalization of work make such technologies more useful than ever going forward, since so much more of the economy is now being captured digitally? If agglomeration economies have driven the spatial evolution of industries, will Covid act as a “great decongestant” given the realization that the costs of agglomeration in the form of viral diffusion may be significant? Perhaps the pandemic will hasten the process of de-globalization and the withdrawal from trade and collaborative research partnerships across countries and regions. These shifts can have profound implications on the evolution of industrial organization.

Covid as a disease is characterised by an exponential growth process. We have now learned about disastrous consequences when an exponential system collides with a system with fixed or concave capacity, for example, health care systems with fixed capacities trying to manage Covid caseload with exponential growth rates. Furthermore, the heterogeneous geopolitical response to the crisis points to countries having varying institutional capabilities to understand, monitor and effectively manage an exponential system. This situation is emblematic of prior industry collisions (Iansiti and Lakhani 2020) between companies with network-enabled exponential growth and incumbents with fixed capacities in industries such

as software, music, telecommunications, hospitality, and transportation sectors. Here too, new entrants with digital operating models established exponential growth trajectories that greatly weakened or destroyed incumbents with fixed capacities (e.g., Amazon versus the US retail sector, Google versus traditional advertising, or AirBnB versus the hotel sector). Given the prospect of future pandemics and digital-enabled entrants in many industries, a key research area is the organizational and industrial strategy to deal with exponential systems.

Distributional Consequences of Innovation

The pandemic has heightened our self-awareness of inequity through its disproportional impact on individuals and disenfranchised communities. While research exists on how digital access can improve life chances, the pandemic has thrown social inclusion in sharp relief. Future research now has a discontinuity to study the distributional consequences of innovation and the adoption of new technologies: who benefits from innovation? Who is excluded from wealth creation, and what are its implications for wellbeing? The pandemic may have provided a fillip to businesses pursuing sustainable outcomes. Breathable air, cleaner oceans, and stories of wildlife reclaiming areas fallen to human habitation during Covid lockdown have sensitized our collective conscience to the need for innovations in technologies and business models to combat climate change and promote sustainable development (George, Merrill and Schillebeeckx, 2020). As we examine the effects of the pandemic, we need to be aware that its effects on populations are not the same.

Conclusion

There is little doubt that the pandemic has altered the way we live and work. In this essay, we have explored some fundamental changes in our assumptions underlying theories of innovation. We encourage scholars to help the world better understand the longer term implications of this crisis, and how we can contribute evidence to ongoing debates on the future of management and business.

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