R&D Management at a time of crisis: what are we learning from the response to the COVID-19 pandemic?

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1. Introduction: the reason for a Special Call about the effects of COVID-19 in the R&D Management Journal

The year 2020 will be synonymous with the global threat posed by the COVID-19 pandemic. Unfortunately, at the start of 2021, despite herculean efforts at a global level, we are still wrestling with the ‘grand challenge’ presented by the spread of the virus and its emerging variants. No region in the world has escaped the impact of COVID-19, with our daily news media’s reporting gruesome updates on the death toll and intensive care units hospitalisations, unprecedented demands for healthcare systems and industry, increased social inequalities, and heightened levels of stress for individuals arising from the limitation of personal freedom and socialisation. COVID-19 represents a novel type of challenge not only to modern society but also one where mankind has the potential to make a positive intervention to affect the outcome, experimenting collaboration dynamics on a global scale.

Although no one can predict when this pandemic will be overcome, we have seen incredible global R&D efforts from several sides of society. The global innovative response to this trauma has indicated that the community has been agilely adapting its processes and has fronted the emergency in many innovative ways. The achievements to date justify our optimism that better days are ahead of us. For all these reasons, in February 2020, we called for contributors to the R&D Management Journal to contribute in capturing the synergistic learning so far, so that the current and other future grand challenges can be better addressed.

While currently (January 2021) the feelings of optimism can be somewhat justified since the announcement of a vaccination campaign rollout, March 2020 was a much bleaker time, as society was mentally and physically struggling to come to terms with the spread of this new virus, and how it could be controlled. The necessity of strict societal lockdown to curtail both movement and socialisation ‘snowballed’ across countries as the most powerful weapon available to impede the virus’s spread and the death of many.

The excessive use of natural resources, the drastic human intervention on wildlife habitats, the concentration of people in megaurban centres, the distribution of
global supply chains and the rapid movement of people and goods across borders, have all been somewhat associated with the causes of this virus’s spread and the subsequent global carnage. All these are certainly consequences of human development. Yet, the capability to provide a coordinated and effective response to a pandemic is also a prerogative of our ‘modern’ civilization. Help and action to fight the virus and reduce its consequences can be faster and more efficient than in the past. The response to the crisis which gives hope for the future is founded on a science, technology and innovation (STI) capability developed over time, based on both technological development and new knowledge of how the improvements can be obtained via management processes (i.e. what we normally encompass as R&D management activities).

Nurtured by this knowledge reservoir and by supportive government policy action, scientists from diverse disciplines and regions have purposively engaged to address the COVID-19 impacts on health, economy, regulation, working and education practices and wider sociological problems. Industry, like other parts of society, has suffered because of the crisis, but has also entrepreneurially rearranged to respond to the COVID-19 challenge. In fact, the emergence of COVID-19 has been a phenomenal stimulant of worldwide R&D activity to protect human life, producing rapid and potentially disruptive innovative outcomes from both traditional and eclectic sources. For instance, companies have repurposed existing equipment to rapidly develop/deliver crucial products and services [e.g. personal protective equipment (PPE) masks] that were initially in short supply worldwide, while others embarked on long-term projects to address root causes of the pandemic (e.g. vaccines).

Private and public R&D laboratories worldwide found new ways to engage to generate results for promising and innovative medical treatments and vaccines. Digital technologies (e.g. phone apps) have been used to obtain updated maps of the infection spreading and timely alert citizens of their contagion risk. High-tech – and non-high-tech – companies increased or pivoted their production to meet the demand of complex medical devices or components. Crowdsourcing methods were deployed to create innovative solutions, and digital manufacturing technology, such as 3D printing, were used to manufacture innovative or missing components for medical or PPE. Universities worked on new algorithms for data analysis and were involved in manufacturing processes for chemicals, electronics and in redesigning hospital workflows. Regulatory processes were refined to remove constraints to solutions development and deployment by embracing smarter ways of working that reduce the time to market while maintaining safety standards.

The societal goodwill and desire to contribute nurtured new organisational structures and collaborations that all contributed to the COVID-19 fight and ultimately saved lives. These stories show how the closer analysis of current R&D activities can teach us much about how to manage R&D and Innovation, both at the time of crisis and in calmer circumstances. Never before in peaceful times was the collective capability and creativity of the R&D Management community so needed or the potential impact of its output so immediately visible to society. What can we learn from studying these efforts?

Against this background of the centrality of the R&D Management community in addressing the COVID-19 crisis, sits this call for research papers. Given the sense of urgency and the scale of the challenge, we understood the importance of capturing emerging developments in R&D Management processes as the community contributed to fighting COVID-19. We wanted to capture the observations on the go, cognizant of the need to disseminate emerging practice in a timely fashion. Hence, we asked researchers to contribute COVID-19-related cases that could capture the ongoing practice and response, as well as point towards new avenues. These timely and impactful cases should represent not only relevant, but also complementary, contrasting and possibly surprising contributions to our R&D and Innovation management knowledge. As the phenomenon is still ongoing and the observation of researchers continues, the call was also designed to accommodate research articles underpinned by more rigorous data, captured over a longer period of time and framed in stronger theoretical background. Through this dual strategy, the editorial team hoped to seize the highlights of this unprecedented time from a R&D Management perspective.

The response of the R&D management community to the call counts 113 submissions and has so far exceeded any expectation. The contributions describe COVID-related R&D management practices from across the globe: China, India, Russia, Italy, UK, France, Brazil, US and several other countries. Given the overwhelming number of submissions, the editorial team have tried to secure robust reviews to ensure high quality, further nurture the development of the papers and ensure timely dissemination.

2. The first five papers

This issue of R&D Management introduces the first five papers accepted for publications in response to call. The remaining papers will be published as soon as they become available and, finally, a reflective editorial paper synopsising the collective contributions.
and critiquing the collective implications for our discipline and relevance for other grand challenges will also be written.

Here, we attempt a first grouping of the contributions, including references to papers still in the review process. This rough classification starts building a picture which we will complement and perfect as the whole set of contributions will be released.

2.1. The contribution of public R&D to the achievement of societal goals

This topic includes a rather wide range of papers, highlighting the achievement of societal benefits via R&D efforts. These reflect examples of open social innovation (Chesbrough and Di Minin, 2016; Ahn et al., 2019) whereby the contributors to the innovation development deploy public resources and competences for developing innovation for societal benefit. Some of the contributions make it clear how past investments in research and in the training of experts (or insufficient investments in those activities) revealed to be crucial during the crisis. Other papers showed how specific competencies of public research organisations were used to determine fast reaction to produce specific items suddenly in shortage.

Battaglia, Paolucci and Ughetto’s paper ‘The fast response of academic spin-offs to unexpected societal and economic challenges. Lessons from the COVID-19 pandemic crisis’ contributes to this stream. It describes the case of Omnidermal, an academic spin-off company that made an efficient and easy-to-realise emergency life-support machine to be used in intensive and sub-intensive care units. The authors emphasise how the dramatic situation creates a context in which market needs are particularly well-defined. This becomes a positive aspect for academic spin-offs, since they are rich in terms of competences, but often face difficulties in understanding which kind of products and services to produce (and for what markets) might be developed with their advanced scientific and technological skills.

2.2. Open innovation mechanisms for societal goals: crowdsourcing

Several papers have emphasised the importance of the collaboration among different organisations and individuals. The importance of joining forces in R&D and innovation is well recognised both outside and in times of crisis. Unsurprisingly, we hence have seen a number of papers emphasising the role of Open Innovation processes in a number of contexts. Of particular note are the papers discussing the role of crowdsourcing initiatives. Such initiatives have been and are currently used both to disseminate useful information about the pandemic (e.g. data, protocols, open designs for machineries, etc.) and to collectively and creatively generate innovative solutions with a bottom-up approach. One of these initiatives, Ubora, has, for instance, been very useful in mitigating the effects of COVID-19 in Africa.

Vernicelli, Cricelli and Grimaldi, in their article, How can crowdsourcing help tackle the COVID-19 pandemic? An explorative overview of innovative collaborative practices, illustrate 16 crowdsourcing initiatives devoted to COVID-19 and propose a classification along two dimensions, that is type of crowdfunding configuration and kind of tasks. In terms of useful lessons for the future, the authors argue that crowdfunding can be very useful during crises by providing original, actionable, quick and low-cost solutions.

2.3. Bottom-up innovation and its integration with mainstream efforts: makers, user-innovators and frugal innovation

Several papers concentrate the role of innovation emerging organically from self-organised citizens and bottom-up sources. The shortfall in essential items such as ventilators, face masks, face shields, etc., has inspired individuals to organise to provide help. ‘Do-it-yourself’ hobbyists and makers started to use digital fabrication tools to produce such critical items. This has been particularly important in the first phase of the pandemic when scarcity was at its greatest. As a matter of fact, makers had already been active for humanitarian purposes, but never with such intensity, and some contributions emphasise how these practices have managed to reach mainstream attention thanks to the time of crisis. These papers impact also on topics such as ‘frugal innovation’ – the practice of doing more with less, for more people.

In this stream, we see the paper, Frugal innovation in a crisis: the digital fabrication maker response to COVID-19, by Lucia Corsini, Valeria Dammicco and James Moultrie. The authors present two case studies: one from Italy and one from India. They suggest that current theories of frugal innovation can be expanded to new geographical and technological contexts. In particular, the authors try to connect frugal innovation and the makers’ movement.

Another paper that fits within this stream is the paper, Bottom-Up Solutions in a Time of Crisis: The
Case of COVID-19 in South Korea, by Hyunkyu Park, Miyoung Lee and Joon Mo Ahn. The authors do not focus on the traditional and expected top-down solutions designed and implemented by central governments or regional health authorities, but rather they emphasise the relevance of bottom-up solutions that may start from rather peripheral settings. Such solutions emerge as very valuable for their adoption at central level. Relevant examples are drive-through testing in South Korea (invented by a fringe doctor) and the many free apps which provide information about COVID-19, developed by students all over the world. Interdisciplinary collaborations and prior knowledge, together with the presence of effective innovation intermediaries, contribute to the success of such bottom-up solutions within national strategies and are crucial to face COVID-19 emergency.

2.4. Management of intellectual property

The management of IP is with no doubts a major topic of discussion during the COVID-19 pandemic and much discourse relates to patents for the new vaccines. Debate regards ethical issues and the need of using open pledges for this kind of innovation, is important especially when poor countries need vaccines. This theme also regards the geo-political use of vaccines and, lastly, it considers the discussion about the balance between public and private research efforts and the ownerships of the results. However, beyond the major example in IP management for vaccines, the crisis is having an impact on the IP and R&D strategies pursued by companies. Several companies have adopted ‘positive’ innovation actions, proactively trying to develop new products and services in order to respond to the new needs emerging during COVID-19. In other cases, ‘defensive’ actions were implemented aimed to become more efficient and be able to manage R&D and innovation processes despite emerging economic difficulties, such as budget constraints. Both types of actions have often involved IP management, in terms of acquisition of external IP and better management of internal IP.

This latter topic is addressed by Guderian, Bican, Riar and Chattopadhyay, in their article Innovation management in crisis: patent analytics as a response to the COVID-19 pandemic. Through a series of cases, the authors emphasise the role of patent analytics as a tool to pursue different R&D strategies. It can be used to increase revenues (via sales and licensing deals) and also to determine cost-savings, by abandoning patents which are not used. Further to these known management practices, the authors also discuss how patent analytics can be used to detect key biotechnology firms that are likely to be successful in developing new treatments.

As mentioned above, the collection in this issue aims to release the learnings as they emerge from the broad set of observations of the R&D Management efforts to fight COVID-19. This editorial will be updated and complemented as new papers will be released over the coming year and converge in the final version at the closure of this rolling special issue.

References

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Note

1 Grand challenges are specific critical barrier(s) that, if removed, would help solve an important societal problem with a high likelihood of global impact through widespread implementation (George et al., 2016, p. 1881).