# Guest editorial: Modelling the business and societal decisions under the impact of COVID-19

## 1. Introduction

A recent literature base shows that the researchers (Roda *et al.*, 2020) have addressed multiple health-care issues during the lockdowns and unlock periods (between March 2020 and March 2021) to mitigate the effects of corona virus disease-2019 (COVID-19) transmission. Though, modelling approach is found to be beneficial in analysing widespread of pandemic and formulation of business, economic and societal strategies pertaining to quarantine and isolations (Hellewell *et al.*, 2020), physical distancing (Robertson, 2019) and health-care infrastructure capacities estimation (Wood *et al.*, 2020). Frequent variants and waves of the pandemic disrupt the economies, work normalcy, as well as mental fitness of the society which demands rerunning of proposed models with relevant business scenarios to control unforeseen situation more accurately. The supportive models would assist government authorities to decide with policies for lifting up the economy during-and-post pandemic while balancing societal health. Further to this, it is required to confirm that weather the existing models are competent enough to speculate the unforeseen economical challenges resulting from the COVID-19? Also, the regulatory agencies and economists are not aware with how much spending on health-care research, development and management affect economical growth? Hence, it is thought that there is a need of dedicated research theme that looks forward the post COVID-19 management challenges through modelling approach.

Out of submitted research works, some of allied papers have been taken forward catering to the proposed theme of special issue revolving around assessing, modelling and analysing the economical, societal and managerial implications of COVID-19. The addressed research questions include the following: How spending on healthcare research and distribution of essential goods affects economical growth?, How modelling-simulation could support with fair, effective and efficient management of vaccination distribution program?, How technological applications and prediction tools help to analyse the business models and societal issues during and post COVID-19 outbreak? and Has the pandemic situation created opportunities for new businesses? If yes, can we test and validate different business scenarios through simulation modelling before its actual implementation? The authorwise listing of papers cited hereafter is as follows: first: Thakkar *et al.* (2022); second: Toumi *et al.* (2022); third: Bhide and Akarte (2022); fourth: Wang *et al.* (2022); fifth: Singh and Sharma (2022); sixth: Sreenivasan and Suresh (2022); seventh: Vimal *et al.* (2022); eighth: Trivedi *et al.* (2022); and ninth: Kumar *et al.* (2022).

Section 2 discusses the studies contributing towards derived business and societal research issues, its implications towards food supply chain-manufacturing operations, health care and emergency logistics and startups. Section 3 puts forward the practice-oriented models and policies drawn from the COVID-19 experiences that businesses, government organizations, society and research communities can use to combat such unforeseen events in future. Finally, Section 4 concludes with applications, limitations and future research directions of each study.

**1018**

## 2. Contribution towards literature

The objective is to draw meaningful novel methods, models and business policies by establishing the linkages between academic theories and industrial problems through modelling approach. Each paper has contributed as follows.

First: The Balanced ScoreCard (BSC) is enhanced to classify service quality parameters and map them with performance of health-care sector under the impact of COVID-19. An integrated approach of fuzzy-DEMATEL and ANP is used to prioritize the factors affecting health-care service quality and accessibility. It overcomes the limitations of traditional approaches such as AHP which do not account interdependency of different factors and uncertainties during COVID-19. The patient's waiting time and bed occupancy are found to be moderately affecting service performance. However, the training and staff turnover rates are found to be highly affecting the customer's expectations and profitability. A quantitative framework assessing health-care service quality and resources' allocation under pandemic uncertainty is unique contribution of this study. Second: The earlier study focuses on operational context and organizational financial performance, but it does not account health-care sector's impact on economical outcome. The study of Toumi *et al.* (2022) addresses this gap by extending its geographical scope to the Middle East and North Africa region to assess the country's economical performance. The model could be further extended to predict the patient data for quick medical response through personalized treatment.

Third: The remanufacturing feasibility assessment model has been proposed by Bhide and Akarte (2022), considering associated costs of various sanitizer bottle-manufacturing activities. A hybrid manufacturing–remanufacturing system has been mathematically modelled and tested with system dynamics approach, which states that reverse logistics, inspection and holding are major cost-contributing factors. Also, lesser remanufacturing efforts are required compared to first manufacturing system once it attains stability. Fourth: Wang *et al.* (2022) contribute to business resilience through the development of a real options approach (ROA) using COVID-19 scenarios. A stochastic modelling process and simulations using ROA suggest how current information and strategic portfolios predict the growth problem under unforeseen events towards "endemic", i.e. post-COVID-19 impact. The uniqueness of this study is that the proposed framework structures future uncertain choices rather than confirming past success in respect to adopted strategy.

Fifth: The adoption of financial payment technologies is widely accepted during pandemic time due to restricted movements, physical and social distancing. Singh and Sharma (2022) conducted a structural equation modelling-based analysis of the factors affecting adoption of such financial services industries. The perceived risk, severity, individual mobility, subjective norms and ease of usefulness are found to be significantly affecting the TAM during COVID. Multiple changes have been experienced by various business dynamics of the organizations. Some businesses have been totally shut off, whereas some have changed their products and services to fulfil the needs arise due to COVID-19. The opportunities are explored by various start-ups; therefore, the organization must get ready for the structural changes during and post-pandemic. Sreenivasan and Suresh (2022) presented a framework to quantify relationships among various determinants of organizational readiness towards change in start-up businesses during emergencies. The TISM-MICMAC-based integrated method has identified the clarity of mission and goals, reward system, technological advancement and motivation as factors to be considered.

The technology plays a vital role in tracing the inventory in a situation of contactless environment during pandemic. A fuzzy AHP and TOPSIS-based multi-criteria decision-making approach is applied to apparel supply chain to decide priority for the RFID

applications in such businesses. The model improves up-and-downstream operational visibility of supply chain activities and tracking of garments. It also helps in setting the preferences among employment alternatives to tech-economical feasibility of stakeholders. Eighth: As the state-of-art base of existing literature lacks the information about research to be conducted upon, Trivedi *et al.* (2022) analysed sources using topic mining approach to identify the same. Though this study contributes very little to the literature, it highlights research issues that need to be addressed in contemporary pandemic time. This is the major reason of inclusion of this study which researchers may use to enhance in future. Ninth, the impact of COVID-19 on various aspects of sustainable supply chain has been investigated by Kumar *et al.* (2022). The food and necessary supplies during emergency have been selected to explore the societal, business and economical dimensions of supply chain. Digitization, governmental policies and intermediatory interventions are found as helping hand to improve business sustainability, whereas geopolitics has proved to be harmful aspect.

## 3. Practical implications

Though the geographic scope of the study was limited to Indian territory, it is expected to validate it through massive data sets under various societal contexts. The outcome of the developed framework by Thakkar *et al.* (2022) helps health-care practitioners to design policies for sustainable organizational performance and its financial growth. The government and medical agencies could also apply it to derive decisions affecting customer's expectations under scarcity of resources. The health-care practitioners and government agencies can classify the geographical regions on the basis of economical criteria and design regulatory policies for public health-care treatments (Toumi *et al.*, 2022).

Third paper assists government agencies to examine the reasons that encourage re-manufacturing abilities towards achieving sustainability and quickly responding to combat COVID-19 situation. Though the scope is confined up to demand and returned products only along with penalty and subsidy charges, the future study may accommodate reverse logistics, return collection and other affecting factors. The fourth paper (Wang *et al.*, 2022) predicts and assesses the economical impact of COVID-19 through capability–behaviour approach that drives resilience. The findings highlight an emergent correlation between circuit breakers and lockdowns, which have affected an inverse growth of global businesses and trades. The insights are used by both government and corporate sectors in deciding opportunities under the immediate context of pandemic through various alternatives. The research of Singh and Sharma (2022) could be extended with its geographical scope and user other affecting factors as per existing TAM. The service providers may use the outcomes to design policies under the pandemic situation and insist users for technology adoption through various strategic incentivised schemes.

The supply chain practitioners can use the assessment framework (Vimal *et al.*, 2022) to track and reduce unwanted inventories to reduce business losses. The interrelationships among factors that influence the organizational dynamics to be accounted while starting up new ventures. Practitioners can use this model of Trivedi *et al.* (2022) to further test, validate and prioritize these factors under the impact of pandemic to build concrete roadmap. The practitioners may derive helpful policies from the study of Kumar *et al.* (2022) by designing more resilient and sustainable food supply chains. The findings could be more thoroughly supported by matching it at different geographical set-up to combat COVID-19 impacts in future.

## 4. Conclusion

Multiple shiftings in economies, societies and businesses around the world have been witnessed since the past two years as an impact of COVID-19 outbreak and its different variants. Though there were lot of themes suggested for this issue, the selective papers are published focusing on analysing different organizational and economical aspects of inventories (Vimal *et al.*, 2022) and manufacturing capabilities (Bhide and Akarte, 2022) through fuzzy and system dynamics modelling. A detailed assessment of the social and business impact of COVID-19 can be carried out through multi-criteria decision-making methods to derive more informed frameworks. This study could be further extended to assess the government policies for lifting up the economy during and post-pandemic, which is unaddressed issue of this proposal. The studies of Thanki *et al.* (2022) and Toumi *et al.* (2022) cover health-care operations and effective vaccination distribution plans, respectively. Kumar *et al.* (2022) suggested a factor-based empirical analysis to design sustainable food supply chains. However, in light of this, probabilistic and mathematical approaches to model storage and distribution of food, essential consumable products and services under uncertainties are yet unaddressed out of proposed themes. Also, the simulation and modelling of epidemically controlled business logistics and migrations are useful for the government agencies to design lifting up policies. The economical impact of COVID-19 on businesses and global trade has been analysed by Wang *et al.* (2022) in their paper, which is useful to the government agencies and departments in amending analogous policies.

The technological adoptions (Singh and Sharma, 2022) and allied decisions of the organizational and micro-financial performances hampered due to COVID-19 are assessed to derive mitigation plans. However, more thorough macro-level econometric models and analysis is desired to predict economies affected due to COVID-19. Also, data science and mining-based technological applications to analyse the business models during COVID-19 outbreak are expected in future. Further the model and findings of Sreenivasan and Suresh (2022) could be useful for the unicorn start-ups, MSMEs and public ventures to come up with new business models responding to COVID-19. The social organizations, strategists, economists, policymakers and entrepreneurs are expected to refer to presented research models and extend it by sharing their experiences. The practitioners may propose new theoretical models or apply existing ones by transforming them to identify unforeseen business challenges and support managers with informed decisions under pandemic uncertainty. It also helps to envisage concrete decisions, policy framing and amendments by simulating business decisions and societal models analysing depicted situation in-prior before its actual implementation. The researchers are expected to further explore the directions and test the models highlighted in published papers.

**Bhavin Shah**
*Department of Operations and Supply Chain Management,*
*Indian Institute of Management Sirmaur, Paonta Sahib, India*
**Vikas Kumar**
*Faculty of Business and Law, University of the West of England, Bristol, UK*
**Banu Yetkin Ekren**
*Cranfield University, Bedford, UK, and*
**Guilherme Francisco Frederico**
*School of Management, Federal University of Parana, Curitiba, Brazil*

## References

Bhide, A.V. and Akarte, M.M. (2022), "Hybrid manufacturing-remanufacturing system of essential commodity in the context of COVID-19", *Journal of Modelling in Management*, doi: 10.1108/JM2-11-2021-0281.

Hellewell, J., Abbott, S., Gimma, A., Bosse, N.I., Jarvis, C.I., Russell, T.W., Munday, J.D., Kucharski, A.J., Edmunds, W.J., Funk, S., Eggo, R.M., Sun, F., Flasche, S., Quilty, B.J., Davies, N., Liu, Y., Clifford, S., Klepac, P., Jit, M., Diamond, C. and van Zandvoort, K. (2020), "Feasibility of controlling COVID-19 outbreaks by isolation of cases and contacts.", *Lancet Global Health*, Vol. 8 No. 4, pp. 488-496.

Kumar, V., Yetkin, E.B., Wang, J., Shah, B. and Frederico, G. (2022), "Investigating the impact of COVID-19 on sustainable food supply chains", *Journal of Modelling in Management*, doi: 10.1108/JM2-03-2022-0072.

Robertson, D.A. (2019), "Spatial transmission models: a taxonomy and framework", *Risk Analysis*, Vol. 39 No. 1, pp. 225-243.

Roda, W.C., Varughese, M.B., Han, D. and Li, M.Y. (2020), "Why is it difficult to accurately predict the COVID-19 epidemic?", *Infectious Disease Modelling*, Vol. 5, pp. 271-281.

Singh, A.K. and Sharma, P. (2022), "A study of indian gen X and millennials consumers' intention to use FinTech payment services during COVID-19 pandemic", *Journal of Modelling in Management*, doi: 10.1108/JM2-02-2022-0059.

Sreenivasan, A. and Suresh, M. (2022), "Modelling of factors influencing organizational readiness for change in start-ups during the COVID-19 emergency", *Journal of Modelling in Management*, doi: 10.1108/JM2-02-2022-0040.

Thakkar, J.J., Thanki, S. and Guru, S. (2022), "A quantitative framework for health-care service quality assessment in India", *Journal of Modelling in Management*, doi: 10.1108/JM2-11-2021-0279.

Toumi, A., El Khoury, R., Harb, E. and Nasrallah, N. (2022), "Modelling COVID-19 effect on the performance of MENA health-care sector", *Journal of Modelling in Management*, doi: 10.1108/JM2-01-2022-0004.

Trivedi, S.K., Patra, P., Singh, A., Deka, P. and Srivastava, P.R. (2022), "Analyzing the research trends of COVID-19 using topic modeling approach", *Journal of Modelling in Management*, doi: 10.1108/JM2-02-2022-0045.

Wang, Z., Upadhyay, A. and Kumar, A. (2022), "A real options approach to growth opportunities and resilience aftermath of the COVID-19 pandemic", *Journal of Modelling in Management*, doi: 10.1108/JM2-12-2021-0302.

Wood, R.M., McWilliams, C.J. and Thomas, M.J. (2020), "COVID-19 scenario modelling for the mitigation of capacity-dependent deaths in intensive care", *Health Care Management Science*, Vol. 23 No. 3, pp. 315-324.

## Further reading

Peng, L., Yang, W., Zhang, D., Zhuge, C. and Hong, L. (2020), "Epidemic analysis of COVID-19 in China by dynamical modeling", arXiv preprint arXiv:2002.0656.

Singh, S., Kumar, R., Panchal, R. and Tiwari, M.K. (2020), "Impact of COVID-19 on logistics systems and disruptions in food supply chain", *International Journal of Production Research*, Vol. 59 No. 7, pp. 1993-2008.

Valizadeh, J. and Mozafari, P. (2021), "A novel cooperative model in the collection of infectious waste in COVID-19 pandemic", *Journal of Modelling in Management*, Vol. 17 No. 1, pp. 363-401.

WHO (2021), "WHO", available at: www.who.int/data/collections (accessed 26 March 2021).