IFAC MIM 2022

June 22-24, 2022, Nantes, France

Invited Session on:

Supply Chain and Logistics Networks under Pandemics Situations

Proposed by:

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Aim and content of the invited session:

Among disasters, outbreaks of pandemics account for excessive human and material damages, including a significant number of deaths. During any pandemic, healthcare providers and policy-makers face two challenging phases [1,2]: 1) Phase 1 (emergence/progression of the pandemic) – A sharp increasing trend in demand for medical/health resources to combat the spread of the disease and to cure the infected patients with severe conditions; and 2) Phase 2 (stop/avoid the pandemic) – In case of identifying an effective vaccine, a crucial demand for an effective global vaccination campaign to vaccinate the population to stop/avoid the disease, knowing that the vaccines are not immediately available and may even become available with considerable delays.

Increasing the production of medical resources, encouraging health resources to displace among health centers, and increasing the capacity of public hospitalization beds and biology tests in Phase 1 as well as identifying and producing tens of effective vaccines in Phase 2 are the essentials to encounter these phases. However, any success in these phases highly depends on developing efficient logistics networks and requires taking detailed operational actions to produce/share/distribute medical/health resources (Phase 1) and distribute/aalocate vaccines among the population through an effective vaccination campaign (Phase 2) [3].

This invited session welcomes innovative ideas that aim at developing methodologies, particularly optimization frameworks, to combat the pandemic or even alleviating the post-pandemic effects. Topics to be captured contain, but are not limited to, the following:

- Post-Pandemic Supply Chain Network Design
- Logistics Network Design and Pandemic Situations
- Medical Products' Production and Distribution
- Medical Resource and Patient Sharing
- Vaccine Allocation and Distribution
- Inventory Management of Medical Needs
- Vaccine Allocation and Epidemiological Models
- Vaccination Strategy Optimization
- And other related aspects where machine learning techniques are integrated to heuristics/meta-heuristics to solve COPs.

References:

1. World Health Organization (2020) Coronavirus disease 2019 (COVID-19): Situation Report, 149; https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports.
2. COVID-19 pandemic: Humanity needs leadership and solidarity to defeat the coronavirus. https://www.undp.org/content/undp/en/home/coronavirus.html. Apr 2020.Organization WH, others (2020) Coronavirus disease 2019 (COVID-19): situation report, 59.
3. D. Bertsimas, V. Digalakis Jr, A. Jacquillat, M. L. Li, A. Previero, 2021. Where to locate covid-19 mass vaccination facilities, arXiv preprint arXiv:2102.07309.