

# **EJOR**

## **OR Applied to Humanitarian Operations**

Luk N. Van Wassenhove, INSEAD

Alfonso Pedraza-Martinez, Indiana University

Maria Besiou, Kuehne Logistics University

Vienna, Austria, June 2017

# Motivation

- Operations researchers' expertise fits humanitarian challenges:
  - multiple stakeholders with different objectives
  - unfamiliar context: dynamic environments with high uncertainty
  - limited resources: needs much higher than funding, skilled people
  - disaster cycle: phases have different characteristics

# EJOR SI – OR Applied to Humanitarian Operations

## Call for papers, 2016

- Interesting and real humanitarian operations that can benefit from analytical modelling
- Conceptual and OR models studying the complexity humanitarian operations are facing
- Methodologically rigorous models, solidly anchored in reality (real data, assumptions convincingly grounded in reality, solutions to specific problems the humanitarian system is facing, validated that can be used in the field preferably by showing evidence of interaction with humanitarian practitioners)

# EJOR SI – Timeframe

- 48 Papers submitted by December 2016
- 13 desk rejections
- Back from reviewers by mid March 2017
- 13 manuscripts in the 2<sup>nd</sup> round
- Back from reviewers by end August 2017

# EJOR SI – Desk rejections

- No use of OR
- Problem not well-motivated or justified – not clear contribution to the literature
- Low level of realism and practicality
- Not clear how the results arise: the reader should understand all assumptions and should be able to replicate results
- Documents poorly written

# EJOR SI – Statistics (Disaster lifecycle)

- Disaster response: 24
- Disaster preparedness and response: 7
- Preparedness: 5
- Disaster detection: 1
- Development: 8

# EJOR SI – Statistics (Disaster types or programs)

- Earthquakes: 17
- Famine: 1
- Floods: 3
- Hurricanes: 3
- Healthcare: 6

# EJOR SI – Statistics (Case Studies)

- US: 6
- Haiti: 5
- Nepal: 4
- Turkey: 3
- Iran: 3
- Pakistan: 2
- China: 2
- Others: Saudi Arabia, Nigeria, Colombia, Indonesia, West Africa, China, Niger, Netherlands, Sub-Saharan Africa, UK, India, Japan, Uganda



# EJOR SI – Statistics (Paper Motivation)

- Location / allocation: 16
- Vehicle routing: 8
- Multiobjective functions: 12
- Risk mitigation and analysis: 5
- Relief distribution: 4
- Supplier selection: 3
- The role of incomplete data: 2
- Others: patients waiting time, early detection of disaster events, volunteer management, evacuation warning, search and rescue, coordination, optimal districting, staff allocation, private partnership

# EJOR SI – Statistics (Methods)

- Geographic Information System (GIS): 2
- Markov chains: 2
- Integer programming: 4
- Stochastic programming: 4
- Heuristics: 7
- Discrete event simulation: 4
- Agent-based: 2
- Others: Lagrangian relaxation method, combinatorial optimization, compartmental models, forecasting models, bayesian probabilities, robust optimization, multi-criteria decision analysis, generalized queuing network