

## **ENSURING FOOD SECURITY UNDER CLIMATE CHANGE: HOW SIMULATION CAN HELP IN MAKING AGRICULTURAL SUPPLY CHAINS MORE RESILIENT**

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### **ABSTRACT**

Climate change and the resulting increased frequency of unpredictable extreme weather events create new operational challenges for the commercial seed industry, which is a key pillar of a sustainable and secure global food supply. More specifically, extreme weather events translate into two main effects on agricultural production: Higher yield variability and lower expected yields. In recent years, extreme weather events already caused reductions in the yields of cereals, maize, and other staple crops. It is also projected that a warming of +2C (+4C) would increase the coefficient of variation of corn yield by 62% (192%) in six countries that collectively account for 73% of global production. In this presentation, we first examine how the increased likelihood of extreme weather events affects agricultural supply chains in terms of R&D, production planning, contracting, allocation, and storage decisions. We then discuss the key challenges associated with each stage and highlight how simulation can help address them under increased volatility.

### **AUTHOR BIOGRAPHIES**

**ENVER YÜCESAN** holds the Abu Dhabi Commercial Bank Chair in International Management in the Technology and Operations Management Area at INSEAD. He is an Industrial Engineer from Purdue University with a PhD in Operations Research from Cornell University. His research is at the interface of simulation, optimization, and statistics. More specifically, he focuses on complementing the modelling power of computer simulation with efficient analysis methodologies to study the dynamic behaviour of complex systems such as supply chains and social networks, which, in turn, enables robust design and effective management of these ecosystems. More recently, he has been focusing on agricultural supply chains to address key challenges such as identification of robust parent seeds, farmer contracting, small holder management, and production and inventory planning under increasing volatility driven by population dynamics and climate change. Over the past three decades, he has also been actively serving the simulation community at large in various editorial and administrative positions; in recognition of his contributions, the INFORMS Simulation Society recently presented Dr. Yücesan with its Distinguished Service Award. He is currently serving as one of the Department Editors in the Supply Chain and Logistics focused issue of IISE Transactions. He has recently been elected as an INFORMS Fellow.