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## Isenberg Faculty and Doctoral Student Co-Author Study on How to Design Supply Chains for Disaster Prevention and Relief

January 10, 2011

The research team of Professor [Anna Nagurney](#), the John F. Smith Memorial Professor of Operations Management at Isenberg, [Min Yu](#), a doctoral student in Management Science, and Professor [Patrick Qiang](#) of Pennsylvania State University Malvern, who received his PhD from the Isenberg School of Management in 2009, have completed a major study on the optimal design of supply chains for products needed in disasters, major emergencies, and pending epidemics.



This research was inspired by such disasters as Hurricane Katrina in 2005 and the Haitian earthquake of 2010. Getting the humanitarian relief supplies of water, food, medicines, and associated services, to the victims had been a major challenge with the absence of well-planned and coordinated logistics a clear problem. There was no central and coordinated control of the distribution of relief supplies for weeks following these disasters. It is clear that a better-designed supply chain would have facilitated the relief efforts and would have resulted in less suffering and lives lost.

Their paper, "Supply Chain Network Design for Critical Needs with Outsourcing," has now been made available online by the publisher, John Wiley & Sons, in the journal, Papers in Regional Science, and will be published in 2011.

With the number of disasters growing over the past decade as well as the number of people affected by disasters, the design of supply chain networks for critical needs products, such as water, food, vaccines, and medicines, is of paramount importance. Such problems are uniquely challenging since the needs of the affected population should be met as closely as possible with the undersupply of food, water, and medicines, leading to loss of life. At the same time, the oversupply of products may also carry costs, due to unnecessary waste and even, possibly, environmental damage.

In the paper, the researchers developed a computer-based mathematical model that allows for the optimal design of such supply chain networks at minimal total cost and with the satisfaction of the product demands at the demand points, as closely as possible, under uncertainty. The model also enables the evaluation of trade-offs associated with in-house production versus outsourcing. The research has relevance to organizations from government-based ones to humanitarian ones that are involved in decision-making in disasters, emergencies, and pending epidemics.

The paper is available from the journal website:

<http://onlinelibrary.wiley.com/doi/10.1111/j.1435-5957.2010.00317.x/abstract>

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### Isenberg News

[Isenberg Faculty and Doctoral Student Co-Author Study on How to Design Supply Chains for Disaster Prevention and Relief](#)

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[Winter Break](#)

December 20, 2010 to January 17, 2011

[Marketing Seminar with Prof. Kusum Ailawadi of Dartmouth](#)

Isenberg 112  
January 28, 2011  
10:30am

[Volunteer Income Tax Assistance Program](#)

Isenberg 27  
February 8 to April 12, 2011  
4:00 - 6:00pm