

# Meet the ITOR Editors Panel

**Anna Nagurney**

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**INFORMS Annual Meeting Phoenix, October 15-18, 2023**



# Acknowledgments

Many thanks to the outstanding Editor of the *International Transactions in Operational Research* (ITOR) Celso C. Ribeiro for his great work and for bringing us together at so many different conferences around the world!



Congratulations on the 30th anniversary of ITOR!

# I Work on the Modeling of Network Systems Including Supply Chains



# My Connections to ITOR

**I have served as an Associate Editor for over 13 years now and the first paper that I published in ITOR was in 2009.**

**My most recent ITOR paper was published in 2022.**

**To-date, I have had 8 of my papers published in ITOR.**

**I have served on its Best Paper Prize Committee several times.**

# What I Appreciate About ITOR

- **Interesting topics** covered in the papers
- **Special issues** - some examples:
  - Multidimensional Finance, Insurance, and Investment,
  - OR and Big Data in Agriculture,
  - Operations Research in Healthcare, and
  - Tutorials in Operations Research
- **Excellent surveys** ranging from logistics areas to finance
- **Best paper awards** in Methodology and Applications and in Surveys and Tutorial categories
- **The Editor and Editorial Board and our meetings around the globe!**

# What I Appreciate About ITOR

And the publisher Wiley recognizes “popular” papers:



The image shows a certificate from Wiley. At the top is a photograph of a snow-capped mountain range. Below the photo, the Wiley logo is displayed in a large, bold, serif font. Underneath the logo, the text reads "Top Downloaded Article" in a bold, sans-serif font. This is followed by "Congratulations to:" and the name "Anna Nagurney" in a serif font. A small icon of a person is to the left of the name. Below the name, a smaller line of text states: "This paper was one of the most downloaded during its first 12 months of publication in". The main title of the article, "INTERNATIONAL TRANSACTIONS IN OPERATIONAL RESEARCH", is printed in a bold, all-caps, sans-serif font. Below the title is the subtitle: "Modeling of Covid-19 trade measures on essential products: a multiproduct, multicountry spatial price equilibrium framework". At the bottom, it says "Manuscript published in four volumes (January 2021 - 28 December 2021)".

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**INTERNATIONAL TRANSACTIONS IN OPERATIONAL RESEARCH**

Modeling of Covid-19 trade measures on essential products: a multiproduct, multicountry spatial price equilibrium framework

Manuscript published in four volumes (January 2021 - 28 December 2021)

# I Have Even Used Tutorials as Readings in My Classes!

## INTERNATIONAL TRANSACTIONS IN OPERATIONAL RESEARCH

### International Transactions in Operational Research

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January / March 2012

Volume 19, Issue 1-2  
Pages 1-322

#### Editorial

##### Tutorials in Operations Research (page 1)

Celso C. Ribeiro and Irene Loiseau

Article first published online: 4 JAN 2012 | DOI: 10.1111/j.1475-3995.2011.00837.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(429K\)](#) | [Request Permissions](#)

#### Original Articles

##### Vehicle routing problems with split deliveries (pages 3-22)

Article first published online: 13 APR 2011 | DOI: 10.1111/j.1475-3995.2011.00811.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(637K\)](#) | [References](#) | [Request Permissions](#)

##### The concepts of revenue management: a tutorial (pages 23-37)

Feder C. Berti

Article first published online: 4 JAN 2012 | DOI: 10.1111/j.1475-3995.2011.00787.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(952K\)](#) | [References](#) | [Request Permissions](#)

##### Operations research in the natural resource industry (pages 39-62)

T. Bjørndal, L. Herrero, A. Newman, C. Romero and A. Veldtraub

Article first published online: 4 JAN 2012 | DOI: 10.1111/j.1475-3995.2011.00800.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(562K\)](#) | [References](#) | [Request Permissions](#)

##### Multicriteria path and tree problems: discussion on exact algorithms and applications (pages 63-98)

João C. N. Climaco and Marta M. B. Pascoal

Article first published online: 7 JUL 2011 | DOI: 10.1111/j.1475-3995.2011.00815.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(769K\)](#) | [References](#) | [Request Permissions](#)

##### A decision support methodology for increasing school efficiency in Bolivia's

low-income communities (pages 99-121)

José Nelson de Figueiredo and Miguel Ángel Marín Barrientos

Article first published online: 4 JUL 2011 | DOI: 10.1111/j.1475-3995.2011.00821.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(1245K\)](#) | [References](#) | [Request Permissions](#)

##### Fragile networks: identifying vulnerabilities and synergies in an uncertain age (pages 123-160)

Anna Nagurny and Qiang Qiang

Article first published online: 7 OCT 2010 | DOI: 10.1111/j.1475-3995.2010.00795.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(973K\)](#) | [References](#) | [Request Permissions](#)

##### A tutorial on branch and cut algorithms for the maximum stable set problem (pages 161-199)

Article first published online: 1 MAR 2011 | DOI: 10.1111/j.1475-3995.2011.00805.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(1057K\)](#) | [References](#) | [Request Permissions](#)

##### Sports scheduling Problems and applications (pages 201-226)

Celso C. Ribeiro

Article first published online: 27 JUL 2011 | DOI: 10.1111/j.1475-3995.2011.00819.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(812K\)](#) | [References](#) | [Request Permissions](#)

##### OR challenges and experiences from solving industrial applications (pages

227-251)

M. Robinson

Article first published online: 4 JAN 2012 | DOI: 10.1111/j.1475-3995.2011.00801.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(4198K\)](#) | [References](#) | [Request Permissions](#)

##### Black Swans, New Nostradamuses, Voodoo decision theories, and the science of decision making in the face of severe uncertainty (pages 253-281)

Moshe Sniedovich

Article first published online: 4 JAN 2012 | DOI: 10.1111/j.1475-3995.2011.00790.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(1309K\)](#) | [References](#) | [Request Permissions](#)

##### Multi-objective optimization using metaheuristics: non-standard algorithms (pages 283-305)

El-Shazali Taibi, Mathieu Bastaroz, Antonio J. Nebro and Enrique Alba

Article first published online: 20 APR 2011 | DOI: 10.1111/j.1475-3995.2011.00808.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(689K\)](#) | [References](#) | [Request Permissions](#)

##### Using OR to adapt supply chain management best practices to humanitarian logistics (pages 307-322)

Lui N. Van Wassenhove and Alfonso J. Pedraza Martínez

Article first published online: 4 JAN 2012 | DOI: 10.1111/j.1475-3995.2011.00792.x

[Abstract](#) | [Full Article \(HTML\)](#) | [PDF\(1053K\)](#) | [References](#) | [Request Permissions](#)

# Deeply Honored

I was deeply honored and delighted to have my tutorial paper, “Fragile networks: Identifying vulnerabilities and synergies in an uncertain age,” *International Transactions in Operational Research* **19**, 123-160, with Qiang “Patrick” Qiang, selected for publication in the 30th anniversary issue and it is open access.

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## Celebrating 30 Years

Read the 30th Anniversary Selected Articles Special Issue

**IFORS**

**INTERNATIONAL TRANSACTIONS IN OPERATIONAL RESEARCH**

**INTERNATIONAL TRANSACTIONS IN OPERATIONAL RESEARCH**

**Fragile networks: identifying vulnerabilities and synergies in an uncertain age**

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Received 20 April 2019; revised in final form 15 May 2019; accepted 10 May 2020

**Abstract**

This paper provides an overview of some of the recent developments in the assessment of network vulnerability and robustness through appropriate tools that focus on the quantification of network efficiency/performance and the identification of the importance of network components, such as nodes and links. We demonstrate both generally considered and well-defined network measures, one can use not only the network topology underlying a particular critical system, but also the underlying behavior of stakeholders, the resulting flows, and related costs in the analysis of networks for operations, whether fixed or elastic (time-dependent). In addition, we provide how to determine the energy associated with network fragilities with a focus on supply chains, as they occur not only in corporate organizations, such as in energy and transportation, but also in healthcare cases, as in the case of the creation of supply and partnership for humanitarian logistics. We illustrate the concepts and tools in this paper, which are based on numerous publications, through a spectrum of applications and numerical examples. Because the number of datasets is growing globally, it is important to have transparent, well-understood, and appropriate tools for the determination of network vulnerability and robustness, as critical infrastructure networks from transportation, telecommunications, supply chains, to financial and electric power, now provide the ties that bind our societies and countries together. Local disruptions can have global impacts, only when network components are identified as so that important and high-risk and critical nodes and policy analysis, as well as planning and engineers, understand in an explicit way which components should be maintained and protected. We work with implications for disaster and emergency preparation as well as national security.

**Keywords:** network efficiency; network performance assessment; network structure; network vulnerability; network fragility; transportation; supply chains; healthcare; financial networks; electric power; water grid; critical infrastructure; emergency and disaster preparedness; supply and application; telecommunications; energy; national transportation; ware-optimization; system optimization

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Published by Blackwell Publishing, 9600 Garsington Road, Oxford, OX4 2DQ, UK and 350 Main St, Malden, MA 02148, USA.



# The Tutorial Was Given at the ALIO-INFORMS Conference in Buenos Aires in 2010





## Pharmaceutical supply chain networks with outsourcing under price and quality competition

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Received 17 January 2013; received in revised form 19 May 2013; accepted 24 May 2013

### Abstract

In this paper, we present a pharmaceutical supply chain network model with outsourcing under price and quality competition, in both equilibrium and dynamic versions. We consider a pharmaceutical firm that is engaged in determining the optimal pharmaceutical flows associated with its supply chain network activities in the form of manufacturing and distribution. In addition to multistage demand satisfaction, the pharmaceutical firm seeks to minimize its total cost, with the associated function also capturing the firm's regional disruptive cost caused by possible quality issues associated with the connectors. Simultaneously, the contractors, who compete with one another inoperatively in prices in the manner of Bertrand, and in quality, seek to secure manufacturing and distribution of the pharmaceutical product from the pharmaceutical firm. This game theory model allows for the determination of the optimal pharmaceutical product flows associated with the supply chain in-house and outsourcing network activities and provides the pharmaceutical firm with its optimal make-or-buy decisions and the optimal contractor selection. We state the governing equilibrium conditions and derive the equivalent variational inequality formulation. We then propose dynamic adjustment processes for the evolution of the product flows, the quality levels, and the prices, along with stability analysis results. The algorithm yields a discretization of the continuous-time adjustment processes. We present convergence results and compute solutions to numerical examples to illustrate the generality and applicability of the framework.

**Keywords:** outsourcing; pharmaceutical products; healthcare; supply chain; supply chain networks; quality; competition; game theory; variational inequalities; dynamical systems



## Cybersecurity investments with nonlinear budget constraints and conservation laws: variational equilibrium, marginal expected utilities, and Lagrange multipliers

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Received 31 January 2013; received in revised form 18 September 2013; accepted 24 November 2013

### Abstract

In this paper, we propose a new cybersecurity investment supply chain game theory model, assuming that the demands for the product are known and fixed and, hence, the conservation law of each demand market is fulfilled. The model is a generalized Nash equilibrium model with nonlinear budget constraints (or which we define the variational equilibrium, which provides us with a variational inequality formulation. We construct an equivalent formulation, enabling the analysis of the influence of the conservation laws and the importance of the associated Lagrange multipliers. We find that the marginal expected transaction utility of each retailer depends on this Lagrange multiplier and its sign. Finally, numerical examples with reported equilibrium product flows, cybersecurity investment levels, and Lagrange multipliers, along with individual firm vulnerability and network vulnerability, illustrate the obtained results.

**Keywords:** cybersecurity; stochastic supply chain; conservation laws; game theory; generalized Nash equilibria; variational inequality; Lagrange multipliers

### 1. Introduction

Supply chains have become increasingly complex as well as global and they are now highly dependent on information technology to enhance effectiveness and efficiency and also to support communication and coordination among the network of suppliers, manufacturers, distributors, and even freight service providers. At the same time, information technology, if not properly secured, can increase the vulnerability of supply chains to cyberattacks. Many examples of cyberattacks infiltrating supply chains exist, with a vivid example consisting of the major U.S. retailer Target cyber

# Examples of My Papers in ITOR

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Int. Trans. in Op. Res. 29(2022) 226–239  
DOI 10.1111/itor.12266

INTERNATIONAL  
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## Modeling of Covid-19 trade measures on essential products: a multiproduct, multicountry spatial price equilibrium framework

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Received 22 November 2020; received in revised form 5 March 2021; accepted 11 April 2021

### Abstract

In this paper, we develop a unified variational inequality framework in the context of spatial price network equilibrium problems that handles multiple products with multiple demand and supply markets in multiple countries as well as multiple transportation routes. The model incorporates a plethora of distinct trade measures, which is particularly important in the pandemic, as PPEs and other essential products are in high demand, has an effect on supply globally. In the model, products flow as well as prices at the supply markets and the demand markets in different countries are variables that allow us to scientifically address various trade measures, including tariffs, quotas, as well as price floors and ceilings. Qualitative properties are analyzed. Numerical examples are provided to illustrate the impacts of the trade measures on equilibrium product path and link flows, and on prices and demand and supply quantities. Given the relevance of the trade measures in the world today and discussions concerning the impacts, the framework constructed in this paper is especially timely.

**Keywords:** Covid-19; essential supplies; trade measures; spatial price equilibrium networks

### 1. Introduction

The World Health Organization (WHO) declared the Covid-19 pandemic on March 11, 2020 (WHO, 2020a). The emerging global healthcare disaster has endangered and disrupted the lives of billions around the world, resulting in illnesses and deaths, and has also generated secondary crises. No one knows with certainty when the pandemic will end. According to Johns Hopkins

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Int. Trans. in Op. Res. 29(2022) 219–244  
DOI 10.1111/itor.12267

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## Optimization of investments in labor productivity in supply chain networks

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Received 10 August 2021; received in revised form 28 October 2021; accepted 11 November 2021

### Abstract

Labor is an essential resource in the functionality of supply chains. The COVID-19 pandemic has demonstrated the varied impacts of disruptions to supply chains because of labor issues. Shortages of labor continue even now as countries begin to open up with progress on vaccinations. Investing in labor productivity is a possible mechanism in overcoming shortfalls in labor. This paper constructs a supply chain network optimization model, whose solution yields optimal product path flows to demand markets, the optimal investments in link labor productivity, as well as labor hours needed, and the optimal wages of the workers in production, transportation, storage, and distribution. The model includes a budget constraint on the investments, along with maximum bounds on investments on the supply chain network links. The theoretical framework, which includes Lagrange analysis and the computational approach, are based on the theory of variational inequalities. Managerial insights are provided obtained via the Lagrange analysis and a series of numerical examples, which demonstrate that such investments can help both the firm and the consumer.

**Keywords:** labor; productivity; investments; supply chain networks; optimization; variational inequalities

### 1. Introduction

Labor is a critical resource in every supply chain network activity. Without labor, products cannot be produced, transported, stored, and distributed. The COVID-19 pandemic has vividly demonstrated the importance of labor resources, with disruptions to labor, due to illnesses, deaths, the need for social distancing and other mitigation procedures, and even certain labor-related trade measures, affecting the availability of products around the globe as well as product prices (see, e.g., Rayley, 2020; Rossini, 2020; Russell, 2020; Nagurny et al., 2021). Costly (2021) employees

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# Emerging Issues and Trends

**OR has never been more needed to address numerous challenging problems that now face us:**

- Climate change and associated impacts from the increasing number of disasters such as wildfires and pollution, floods, etc.
- Heightened geopolitical risks and the need for better security measures
- Healthcare shortcomings and inequity including inadequate access to medicines and care
- Numerous societal problems from poverty and rising hunger and food insecurity
- Impact of AI and opportunities
- Need for enhanced education and an excellent workforce.

# Tips and Publication Advice

**Your research and papers are part of your reputation, so always do your very best in writing up your research and in proofreading your papers. Be thorough in citations.**

**Referees are volunteers. It is important to be professional in your paper submissions. Take time.**

**Do reach out to potential collaborators. ITOR has “International” right in its title. Conferences are a great venue at which to build your networks and also to find collaborators.**

**Enjoy the process of doing the research, writing it up, and presenting it!**

**Thank You Very Much!**