Rising to the Challenge

Meeting the Growing Skills Gap in Supply Chain Management

Supply chain management has been one of the core competencies of the David D. Reh School of Business; our undergraduate supply chain management program has been ranked in the top 20 nationally for 15 years by U.S. News & World Report. In addition, for the past 18 years, we have offered the Global Supply Chain Management Executive Seminar, which has been attended by some 600 managers, consultants and executives from 45 states and four continents who represent more than 85 globally recognized corporations. Through these interactions, we have come to recognize that there is a growing skills gap for professionals capable of managing increasingly complex supply chain networks. While individuals with proven skills are recruited into higher positions, a lack of education and training leaves few qualified candidates for other critical positions.

There is a pressing need for a flexible, yet highly interactive, specialized online master’s program in supply chain management. We have met this need by designing such a program, building upon the Reh School’s nationally-ranked online MBA program, which is AACSB-accredited — an honor reserved for the top 5 percent of business schools worldwide. Our highly flexible program focuses on practical and adaptable knowledge, providing students with tools and skills that can be immediately applied on the job to lead change and offer creative solutions to supply chain challenges.

As a critical differentiator, the program offers live weekly interactive sessions, emphasizing the personal interaction of the participants with faculty and fellow classmates. Such sessions foster the kind of networking opportunities that have traditionally been reserved for on-campus graduate education. The program is the first online MS in supply chain management offered in New York state specifically designed for working professionals.

In this issue of Linkages, you will read how a deep dive into a research project on demand management (p. 3) and the launch of an eco-friendly startup (p. 8) are providing our students with transformative learning experiences; meet an alumnus who used his Clarkson education to build a successful career in supply chain management (p. 7); and learn about our faculty’s current research, including how disruptive technologies are affecting supply chain management (p. 2) and how algorithms can be used to optimize network performance (p. 6).

We hope you enjoy this issue and welcome your feedback (mahmoodi@clarkson.edu).
Disrupting Supply Chains

New Technologies are Changing the Way Today’s Leaders Manage Supply Chains.

In the global marketplace, the supply chain is everything,” says Ha Hai Ta, assistant professor of engineering and management in the David D. Reh School of Business. “People think of it as relating only to manufacturing and production, but it has broadened to include every aspect of running a business.

“That’s why the management of a global supply chain is critical to every company’s survival.”

For Professor Ta, that survival depends largely on the rapid adoption of new technologies and innovative platforms for production, operations and the delivery of products and services.

“Today, disruptive technologies are driving innovation, guiding decision-making, increasing efficiency, speeding up delivery and lowering costs,” she says. “We’re in a period of rapid change. Companies must keep up in order to avoid becoming irrelevant.”

Prof. Ta’s research revolves around service design, omnichannel retail and innovation that changes the status quo. This includes new technologies — like crowdsourcing, artificial intelligence and block chain — and their impact on supply chains and supply chain management. Her work has been published in top journals in the field, including the Journal of Operations Management, Journal of Supply Chain Management and Journal of Business Logistics.

She joined the Clarkson faculty last fall, after completing her PhD in global supply chain management at the University of Arkansas. She also holds a Bachelor of Science in International Economics from Foreign Trade University in Vietnam and an MBA in management and finance from Clark University.

Her dissertation, “Assessing the Impacts of Crowdsourcing in Supply Chain Logistics and Operations,” analyzed the importance and impacts of the crowdsourcing model in transforming current practices of last-mile delivery and retail operations from the perspectives of multiple supply chain echelons.

Crowdsourcing is the practice of obtaining goods or services from a network of people external to a company who are connected via a mobile or tech platform. These people perform the work that otherwise would be handled by a company’s employees. The most obvious example is Uber.

“But crowdsourcing technology is not limited to transportation,” she says. “The model has moved into logistics and operations, which are the areas I am interested in. Crowdsourcing technology translates into faster logistics, faster product delivery and lower costs. Startups are using it successfully to quickly increase their market share.”

Block chain is another technology that Prof. Ta believes will transform supply chain management because of its ability to digitize, decentralize, secure and incentivize the validation of transactions. More than a secure method of digital payment, block chain can manage agreements like self-executing supply contracts and track processes and products along the supply chain. Prof. Ta is already teaming up with a few of her new Clarkson colleagues to explore funding opportunities for the adoption of block chain technology by New York state farmers.

The ultimate value of disruptive technologies...
“Pharmaceutical companies have some of the most advanced and complex supply chains due to the logistical, legal and production intricacies of the industry and the importance of their products for human health,” says Hannah Phillips ’19.

“Looking at the industry from a supply chain perspective is challenging, especially when it comes to demand management. There are more ambiguities built into long-range financial planning (LRFP) in pharmaceuticals than in other industries.”

Phillips is an Honors student majoring in engineering & management in the David D. Reh School of Business. For her Honors thesis, she decided to take on the multifaceted challenge of demand management to understand how drug companies might improve long-term planning.

As Phillips notes, increasing the accuracy of demand forecasts benefits companies in any industry. “But in the case of pharmaceuticals, it is especially significant because the end customer is a patient who needs a critical medication.”

Phillips was introduced to the concept of demand management in her classes at Clarkson, as well as through two semester-long co-ops.

Working with “Company X,” so-called to maintain confidentiality, she developed a case study to understand the company’s past LRFP accuracy, identify trends in its long-range forecasts and find ways to increase its LRFP accuracy in the future.

She collaborated with the company’s senior demand manager and her staff to put together the research plan, apply statistical methods and analyze a mountain of data related to sales targets and products that were launched over a five-year period. “It was a lot of work,” Phillips says, “but it was worth it.”

Her thesis advisor, Professor Farzad Mahmoodi, agrees. “Hannah’s Honors research not only provided her with valuable practical skill sets, but offered the client company great insights that will significantly improve their business practices.”

The real-world experience also set her apart in a competitive job market. Recently, Phillips accepted a position with BAE Systems in Nashua, New Hampshire, in their Operations Leadership Development Program that starts in June.
Professors Weiling Ke and Augustine Lado, Richard ’55 and Joy Dorf Chair in Entrepreneurship and Innovation and interim dean, are two of the co-authors of the article, “The Effects of Justice and Top Management Beliefs and Participation: An Exploratory Study in the Context of Digital Supply Chain Management,” published in the Journal of Business Ethics.

Prof. Ke also co-authored the article, “Supply Chain Information Integration and Firm Performance: Are Explorative and Exploitative IT Capabilities Complementary or Substitutive?” published in Decision Sciences Journal.


Professor Farzad Mahmoodi, Joel Goldschein ’57 Endowed Chair in Supply Chain Management, has co-authored two articles: “Joint Determination of Supplier Capacity and Returner Incentives in a Closed-Loop Supply Chain,” forthcoming in the Journal of Cleaner Production, and “Navigational Aids for an Uncertain World,” published in the CSCMP’s Supply Chain Quarterly (with Professor Diego Nocetti and Associate Professor Michael Wasserman).

Prof. Mahmoodi also received the 2018 Professor of the Year-MBA Module, awarded by selection of the MBA students.

Assistant Professor Cecilia Martinez authored “Bridging Theory and Practice with Lean Six Sigma Engineering Capstone Projects,” forthcoming in Quality Assurance in Education. The article is based on her paper, which was named first runner-up in the Best Paper competition at the 2018 Engineering Lean & Six Sigma Conference.


R. John Milne, the Neil ’64 & Karen Bonke Associate Professor of Engineering & Management, has been elected fellow of the Institute for Operations Research and the Management Sciences (INFORMS). He was honored “for [his] exceptional practice of operations research, extensive service to INFORMS, and outstanding research in planning, scheduling and supply chain management.”

Prof. R. John Milne
Announcing Clarkson’s 19th Annual Executive Seminar in Global Supply Chain Management
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management.” Prof. Milne has co-authored three articles related to the optimization of airplane boarding and seating assignments in OPSEARCH, Sustainability and Aerospace.

Assistant Professor Amir Mousavian has co-authored papers related to power systems and cybersecurity in IEEE Transactions on Smart Grid, and Global Energy Interconnection. Prof. Mousavian served as organizer and chair for two sessions focused on power system resilient design and optimization, and energy markets at the INFORMS Annual Meeting in November 2018.

Assistant Professor Zhaleh Semnani-Azad has co-authored a paper, “Who Can Lean in? The Intersecting Role of Race and Gender in Negotiations,” published in Psychology of Women Quarterly. This work received media attention from Negotiation Briefings at Harvard Law School for its impact on practice. Prof. Semnani-Azad was also invited to present her research, “Impact of Cultural Factors in Trusting Biometric Technology,” funded by the NSF and Department of Homeland Security, to SRC Inc.

Assistant Professor Chen Xiang co-authored the article, “Polynomial algorithm of inventory model with complete backordering and correlated demand caused by cross-selling,” published in the International Journal of Production Economics.

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- Sikorsky Aircraft
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Network Optimization to Analyze Complex Systems

Assistant Professor Golshan Madraki Develops a Heuristic Algorithm for a Classical Manufacturing Problem

“Because of the explosion of data and complex computer systems, network optimization is a big field nowadays,” says Professor Madraki.

Network.

It’s a popular concept these days used in a number of fields — from social media and healthcare to transportation and cyber security — to analyze highly complex systems.

Assistant Professor Golshan Madraki’s research focuses on the development of algorithms to optimize network performance.

“Because of the explosion of data and complex computer systems, network optimization is a big field nowadays,” says Professor Madraki. “My work is primarily theoretical and revolves around optimizing network performance measures to solve different problems in manufacturing systems, supply chains and energy networks.”

Heuristic algorithms are popular solutions for the scheduling problem and work by following the same procedure. They start with a random schedule and then measure the makespan of the system to calculate its performance. Then the algorithms change the schedule and measure the performance (makespan) again. This procedure is repeated using different iterations until a satisfactory schedule with an acceptable performance measure is found.

“We generated an efficient algorithm called the Structural Perturbation Algorithm (SPA) to accelerate the heuristics solutions for the scheduling problem. SPA uses Directed Acyclic Graphs (DAGs) to model the manufacturing problem and convert the scheduling problem to a longest-path problem in a perturbed DAG. Scheduling heuristics using SPA can calculate the makespan in each trial schedule even faster. This means the overall computational time of the heuristic solutions will be reduced. The application of SPA can be expanded to any problem described by DAGs.”

In 2017, she co-authored a paper on this research in the International Journal of Production Research.

This past year, Prof. Madraki has been developing new graph-based algorithms to make the scheduling heuristic solutions even faster. This research has been submitted for publication and is currently under review. She has also presented her work at professional conferences, as well as served as a session chair and invited speaker on network optimization at the 2018 INFORMS conference in Phoenix, Arizona.

Still, despite the demands of her busy research and teaching schedule, she is pursuing other applications for her work, including a collaboration with Assistant Professor of Engineering & Management Amir Mousavian on research related to cybersecurity and a joint project with Assistant Professor of Electrical & Computer Engineering Yu Liu.

“Clarkson,” she says, “is the perfect-sized university for finding research collaborators in other departments.”

Prof. Golshan Madraki

Prof. Madraki joined the faculty of the David D. Reh School of Business in 2017 after completing her PhD in industrial and system engineering at Ohio University. Her areas of expertise include algorithm development, graph theory, operations research and mathematical modeling.

Building on her graduate research, she has been applying her skills to generate efficient algorithms to improve heuristic solutions for the scheduling problem in manufacturing systems.

The scheduling problem involves determining an efficient order of jobs to be processed by different machines in a manufacturing system. An efficient solution for the scheduling problem results in optimal performance measures for the system, which can eventually reduce production costs. One of the most critical performance measures in a manufacturing process is makespan. Makespan is the greatest completion time of the last part processed by the machines.
Putting the Pieces in Place

Alumnus Jared Lozo Finds Success in the Field of Global Supply Chain Management

Jared Lozo ’07, MBA’09 likes solving problems. Especially the kind that are highly complex and involve lots of moving pieces, like suppliers, materials, manufacturing schedules and customer deadlines.

“When you’re in operations management working with global supply chains, you’re pretty much in the middle of everything,” he says. “You have to ensure that everything is where it needs to be at the right time, at the right price and in the right quantity. There are lots of details to manage, and it’s contingent on all these pieces fitting together in the right places.” It makes, he says, “for very exciting work.”

Lozo has been involved in operations management for more than a decade, working for science and technology companies that manufacture products and materials with stringent quality standards.

He is currently vice president of operating systems for Ensign-Bickford Industries Inc. (EBI), a global science and technology manufacturing company. EBI manufactures products and provides services through its subsidiaries in four platforms: pet food palatability, precision energetic solutions for the aerospace and defense markets, molecular diagnostics for the agricultural life science industry and advanced robotic systems for the space industry.

“My job is to make sure all of our businesses are operating in the same way in terms of strategy, talent and operational excellence, so that we are cohesive in our vision and can differentiate ourselves in the market,” he says.

Lozo first learned about the field of global supply chain management (GSCM) as an undergraduate student at Clarkson. “I was introduced to it in some of my classes and through discussions with my advisor. Faculty often brought their industry experience into the classroom, so I could see the applicability of what I was learning. That prepared me well for the job market.”

After graduating as a GSCM major, Lozo worked in supply chain and enterprise resource planning (ERP) implementation at a hospital for a year before returning to Clarkson for his MBA. He then spent more than six years at Crane Co., starting in their leadership program and working in supply chain in low-cost country sourcing. He moved into an operations function, leading a manufacturing team supporting the automotive industry, and eventually found his way into business management.

After a short stint with a medical device manufacturing company, he was recruited by EBI’s CEO to join the leadership team. It’s a good fit. The company provides the kind of multifaceted challenges Lozo likes to solve.

“We are in a highly technical business, so that limits the number of suppliers that can meet our specifications,” he says.

Costs and lead times are also important. The complicated supply chains are not always set up for the quick turn lead times that the end market demands, and the company must meet cost targets to stay competitive.

Looking forward, Lozo believes that recent trends in consolidation among suppliers, new manufacturing technologies and capacity shortages in the freight industry will pose additional logistics challenges for high-tech manufacturers.

But, he is not too worried. These will simply be new pieces to fit into the puzzle.
A Student Startup’s Quality Clothing and Commitment to Recycling is a Winning Combination

Reh School of Business student Matt Hawthorne ’19 is finding success with his company TerrApparel, an online, sustainable, outdoor clothing business that he founded two years ago.

His business partner, Maura Maguire ’20, a global supply chain management major, shares Hawthorne’s love for the outdoors and high-quality clothing made from recycled materials. Since TerrApparel won at the 2018 New York Business Plan Competition, Clarkson’s Shipley Center for Innovation has given Hawthorne and Maguire an ignition grant to help cover costs for the first year of operation.

One of TerrApparel’s objectives is to make sure none of its garments end up in a landfill. Through a program called “Recycle Us,” customers can send back their used clothing for a discount on their next purchase, and the returned clothing is recycled again. “The program was created to ensure that all of our products are recycled properly and that we can get every ounce of usable life out of the materials we use,” says Hawthorne.

“Through thoughtful decision-making at every step of our product lifecycle, from creation to disposal, we have developed a product unlike any on the market today,” says Maguire.

Our goal is to minimize our impact on the environment in every way possible. Whether it be in the actual materials of our product, the emissions created from manufacturing our product, the chemicals that finish our product, the length of our supply chain or the packaging that our products end up in when they are shipped to our customers, we are always looking for ways to protect the environment.

— Matt Hawthorne ’19 and Maura Maguire ’20

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