

PURDUE
UNIVERSITY®

GLOBAL SUPPLY CHAIN
MANAGEMENT INITIATIVE

2017-2018 ANNUAL REPORT

KRANNERT'S SUPPLY CHAIN CENTER

GLOBAL SUPPLY CHAIN MANAGEMENT INITIATIVE



**KRANNERT
MS OPERATIONS
MGMT.
PROGRAM**
2016 US News &
World Report

#6



**KRANNERT
MS SUPPLY
CHAIN
PROGRAM**
2016 US News &
World Report

#12



AT THE HEART OF A TOP RANKING BUSINESS SCHOOL

A Message From Center Director



Anthony

1

5

1

S

BRIDGING INDUSTRY, STUDENTS, & FACULTY.

INDUSTRY



**KRANNERT'S SMART
LEAN ENGAGEMENT
CENTER**



A CENTER WITH COLLABORATION IN MIND

Technology doesn't stop progressing, and it is the responsibility of every individual to stay up with the newest technological breakthroughs. On a campus dedicated to research and learning, it is only applicable that an initiative dedicated to the management and advancement of manufacturing create an opportunity for those who wish to see the newest technologies first-hand. The Engagement Center is a place where students, professors, and even the general public can learn and experience the some of the newest technologies as well as understand their applicability and usage in a manufacturing setting. The Engagement Center contains a number of different technologies. Starting from the right side of the room as you walk in, there is a computer which runs a live stream of the six cameras placed throughout

the room. The cameras record a live stream, and with a simple code, the computer that live streams the camera feed can run a video analytics tool which counts the number of individuals that enter the center. Moving along the right-side wall and wrapping around to the right corner of the room, a visitor can see six 3D printers. Five of the 3D printers are used in conjunction with the industrial design department, and the last printer is the GSCMI's own. The 3D printers are used to print out a number of different objects including holders for some of the other technologies in the center, center logos, Purdue logos, and a number of other different objects. With 1000s of different free designs online, almost any object can be 3D printed. For the more artistically inclined, custom designs can be made using the software that accompanies the



**TAKE A VIRTUAL TOUR
OF THE SMART LEAN
ENGAGEMENT CENTER AT
[GSCMI.ORG](https://www.gscmi.org)**

During the academic year, the Engagement Center has regular operating hours of 8AM-5PM, M-F located in STEW 162.

3D printers. Next to the 3D printers is the Light Guide System (LGS). LGS is a powerful industrial training tool that incorporates a touch screen, touch pad, and virtual display that can allow users to virtually assemble, repair, or more generally, virtually complete a task. Users can also code their own training programs in the LGS as well as scan using the virtual display to create interactive, realistic training programs. Next to the Light Guide System is the barcode scanning technology. The barcode reader is an electronic device that can read and output printed barcodes to a computer. Scanning technology is familiar to most as a simple and quick way to transfer information with a simple barcode scan. Moving along the wall of technologies, next up is the Google Glass. Google Glass was the first of its kind with regard to an optical head-mounted display designed in the shape of a

pair of eyeglasses. Google Glass was designed to be a hands-free device that has a camera that can take pictures & videos, operate google applications, and operate other free applications built by third-party developers. The next technology shown is the robotic arm which is in the general manufacturing area. The robotic arm can be programmed easily by showing it which movements to make, when to grab an object, and when to place it back down. This programming is a very simple version of machine learning. The far-left wall of the center has two large-screen TVs. The first TV is used to live-stream the Microsoft Hololens. The Hololens is the newest, and arguably the best, mixed augmented reality device. The Hololens can examine a user's environment and create an augmented reality setting that can be manipulated. The Hololens can create augmented reality training sessions

which allow a user to complete a task virtually and then physically. An application that can be used with the Hololens is the Scope AR application where a user can complete a circuit box in augmented reality and then physically. Finally, the other large screen TV is used to demonstrate how drones are used in industry and for personal use. Drones have been gaining traction for uses such as inventory control and even product delivery. The center has three drones – two mini drones and one larger drone that can record drone view.

MATT FOUST MBA 2018



When you work at GSCMI, you work in multi-functional, diverse teams much like in a full-time job, and these experiences are invaluable for future professional endeavors.

One aspect of working in GSCMI is that it allows students to lead teams and work on real-world issues which is a great way to prepare for successful future leadership roles.

While working at GSCMI, students work with professors, industry professionals, and fellow students which allows these students to develop exceptional communication and networking skills.



Matt Foust, MBA 2018 at the Engagement Center.

SHOUNAK JOSHI
MSIE 2018 &
GSCMI student
graduate assistant

BRIDGING INDUSTRY, STUDENTS, & FACULTY.

STUDENTS

JOINING FORCES AN INTERVIEW WITH CENTER GRADUATE STUDENT, SHOUNAK JOSHI

Q: From an IE student's perspective, please describe the importance for your career goals in joining up with the management department to work on projects? Why not just work with IE on projects?

SJ: Industrial Engineering at its core deals with optimizing processes to improve utilization of the 3 M's in any industry – Manpower, Material and Money. Positive results can be seen only when solutions are developed, tested and implemented. IE offers me an opportunity to learn the 'Development' part of the process and the Management department plays a key role in teaching the 'Implementation' part. In order to grow and sustain in today's world, I feel one needs both these skillsets, and this is the reason why I joined GSCMI in the first place. GSCMI is one such unique place where I get to apply whatever I have learned with my IE background in a real time scenario and make an impact in some of the worlds leading companies.

Q: What value have you gained so far working with GSCMI on projects?

SJ: I'd like to stress on two things that I have learned from working with GSCMI on projects. First – the

difference in working for a course project and working with a company project. Before joining Purdue for my Masters, I had just one internship and did not have much experience of working with a company. I had often heard people telling me that working on a company project is far more different and rather difficult than working on a course project. With GSCMI, I got an opportunity to work directly with professionals from the industry that had immense knowledge and experience in dealing with company issues. When you work on a course project, you never think of the problems that one might face while implementing the solution, or you have all the data available before you even start the analysis. But, when working with a company, at every step you need to think about feasibility of implementing the solution. You need to gather data from several different sources and then try to understand it on your own. You need to understand what the company's real objective is and then try to explain the solution in their own terms. You are questioned at each and every step of your analysis by the company's leadership and stakeholders because the company's future is at stake. GSCMI gave me an opportunity to experience all this which I don't think can be learned anywhere else. Second – working in a team and people management. At GSCMI, everyone

works in teams. We have people from diverse backgrounds like Ops, Supply Chain, IE, Business Analytics, and Finance. We all delegate tasks among ourselves, handle problems together, brainstorm ideas in case of road blocks, and deal with clients together. There are so many new things I get to learn from my team mates- their way of thinking, approaching a problem, handling clients- which no course can teach you. Since we have such a diverse group of students, everyone has their own approach towards solving problems which indirectly makes

DR. PAT BRUNESE, IE, TVS PROGRAM LEADER



“ The IE and Krannert collaboration with TVS Motors has been a very fruitful endeavor for our students, faculty, and TVS. The collaboration between IE and Krannert is important to ensure that TVS managers develop a holistic toolkit in operations research utilized at multiple organizational levels in a sustainable manner, much like their exceptional quality management system. ”



the entire process much more creative, innovative and interesting. I remember while working on a project with Cummins, even though our main goal was to develop quantitative models, we had a hard time understanding the data that was provided to us. Luckily, one of our teammates had some experience in manufacturing. He made sure that we all understood the technical terms in the data, and then using his technical acumen and our analytical skills, we developed the final model which Cummins was very happy with. This is what GSCMI has to offer – diverse minds working toward a goal.

Q: What has your favorite project been?

SJ: My favorite so far has been the project with Cummins, which I mentioned earlier. We were a team of five working on the project. Our objective was to develop financial models for the client. The most interesting thing in this project was that it involved analytical thinking combined with manufacturing knowledge. The client was eager on implementing our models, and hence we had to make sure that whatever we were developing was feasible to implement. Often times we used heavy statistical analysis to come up with models. However, it was an enormous task to explain those models to non-technical people in

ways they could relate to. We made sure that the recommendations were easy to grasp at the management level in a business scenario. We submitted the final model in October 2017. We even built a user-friendly dashboard to analyze results from the model. With our models, we were able to improve the expense recovery by 20%.

Q: What is your background and how did you get to where you are?

SJ: I come from India. I was born and raised in the beautiful city of Pune – also referred to as the ‘Oxford of the East’ due to the large number of educational institutes it has. I completed my under graduate in Mechanical Engineering from the University of Pune. After my graduation in 2015, I took a gap of one year to pursue my interest in music after which I came to Purdue for my Masters. I am a percussionist. I learnt Tabla – an Indian percussion instrument for five years in school after which I shifted to playing drums. Back in India, I play for two bands – New Breed (pop rock genre) and Cat Kamikazee (post rock genre). Cat Kamikazee released its debut album – ‘Raining Cats’ in 2015. I joined Purdue in Fall 2016 in the MSIE program

and started working with DCMME in Spring 2017. Even at Purdue, I play for a rock band ‘Vertigo 42’. It’s a good stress buster and keeps my creative instincts alive.

Q: What do you enjoy most about Purdue University?

SJ: Its hard to talk about a single thing. Everything about Purdue is awesome – campus, students, social events that we have here. All of this has been a memorable experience so far. There’s just one thing that sometimes bugs me – ‘The Mid-West Weather’. I remember one time when I experienced all the three seasons on the same day. It was sunny in the morning, raining in the noon and it started snowing late evening. That was fun!

Q: What is your career goal?

SJ: Well, currently I am focused on gaining as much experience as possible in the domains of supply chain and operations. Quiet frankly, I haven’t thought much further about where I would see myself. I am more of a ‘go with the flow’ person and take life as it comes.

STUDENT SCHOLARSHIPS

JOHN DEERE

Marquette Minner
Richard Luan-Jimenez
Darren Young

SUBARU ISUZU

Collin Taylor

MAPLE LEAF FARMS

Cline, Linnea N.
Brumfield, Benjamin D.
Chackochan, Oswin P.

ENSIGN BICKFORD

Alexandra Rocholl-Werner

Through the generous sponsored scholarships provided by our industry partners, students who express sincere interest in supply chain management and manufacturing management can benefit from Krannert's highly regarded undergraduate and MBA programs.

STUDENT SCHOLARSHIP RECIPIENTS Christine Rasquinha, Marquette Minner, Jessica Miller, Richard Luan-Jimenez, Darren Young, Margaret Rochford, Hannah Gates, Alexandra Rocholl-Werner, Blake Mawhorter Shekhar Jha, Deepali Jain

STUDENT GSCM & MTM OPTION CERTIFICATE RECIPIENTS: Christian Bencid, Avanthi Boopalan, Jau Chen, Matthew Foust, Vinay Gundam, Akanksha Gupta, Subhash Katragadda, Mohaneesh Khubchandani, Kody Kleine, Vibhav Mishra, Sarinah Narciso, Amer Nasrawi, Jyothi Pokkunuri, Christine Rasquinha, Matthew Snell, Yanzhou Zheng, Juan Zubillaga, Shashank Chinnolla, Manita Dagar, Adam Davis, Shankar Eleswarapu, Bryan Gissal, William Harbert, Muhammed Karadayi, Nathan Lowe, Saravana Mariappan, Amitesh Mishra, Siva Rai, Jacob Robinson, Murilo Siqueira, Stephanie Takacs, Yi-Hang Yang, David Putt

TVS STUDENT INTERNS: Pranai Abilash Perumareddy, Mauricio Iriondo, Jiani He, Ji Jiang, Nicholas John Molter, Anuj Niraj Mehta, Man Lu, Xiaoli Gao, Kulwinderjit Singh Dhaliwal

STUDENT PROJECT TEAM: Abrar Mohammed, Adarsh Goyal, Amitesh Mishra, Amol Shetty, Anand Deshmukh, Asmita Parashar, Claire Conneely, Deepak gupta, Gopi Manthena, Hardik Shah, Humphrey Kanyoke, Jerry Jana, Jewel James Rodrigues, (Swarup) Jyothi Pokkunuri, Kalyan Mupparaju, Matt Foust, Milay Hemant Haria, Mohammad Rahman, Mohaneesh Khubchandani, Naveed Lalani, Neelesh Prakash, Nick Wright, Nicole Plewniak, Niyati sadhu, Pavni Garg, Pekham Dey, Prasad Gujela, Priyanka Rao, Rishabh Mohan, Rushabh Banthia, Sai Sravan Akasam, Satwik Kulkarni, Saurabh Kurjekar, shashank chinnolla, Shounak Joshi, Shubhda Kulkarni, Siddhanth Rajagopalan, Sushant Bhat, Swathi Veeradhi, Tanya Arora, Vibhav Mishra, Yash Ambegaokar

STUDENT INVOLVEMENT



A special **thank you** to all who contribute to scholarship funding for our students.

TVS INDIA

INTERNSHIP



The TVS India Internship organized by the GSCMI Center in conjunction with the TVS Motor Company was developed in 2006. Providing a unique study abroad internship opportunity in Bangalore, India, this trip assists students in developing a global business perspective while enhancing their resume profiles.

TVS is a Deming Prize winning two wheeler manufacturing company producing motorcycles, scooters, and mopeds. TVS has been credited with many innovations in the Indian automobile industry, notable among them being the introduction of India's first two seater moped. Krannert alumnus Venu Srinivasan (MSM '77) is the chairman and managing director of TVS Motor Company.

Participants have a distinctive occasion to take concepts learned in the classroom and apply them to real life business situations.



Summer interns visiting New Delhi, India during weekend excursion.

“ **TVS PROVIDED ME THE OPPORTUNITY TO ABSORB TEXTBOOK KNOWLEDGE THROUGH APPLICATION.**”

**TVS Intern
MSGSCM**

TVS interns Man Lu and Jiani He standing in front of the Taj Mahal





**AN INCREDIBLE
EXPERIENCE
TO WORK WITH
ONE OF INDIA'S
LEADING
MANUFACTURERS**

NICK MOLTER
TVS Intern
MSBAIM



Nick Molter
visiting the
Taj Mahal.

TVS PROJECTS

STUDENTS: Jiani He (IE), Mauricio Iriondo(IE)

PROJECT OBJECTIVE: Reduce NVA in Plant #1 stores through location study of parts and location

STUDENTS: Man Lu (MSSCM), Anuj Mehta(IE)

PROJECT OBJECTIVE: Simulation to decongest traffic of trucks in Hosur location
(includes inbound, out bound logistics of both 2W and 3W)

STUDENTS: Nick Molter (MSBAIM), Ji Jiang(MBA)

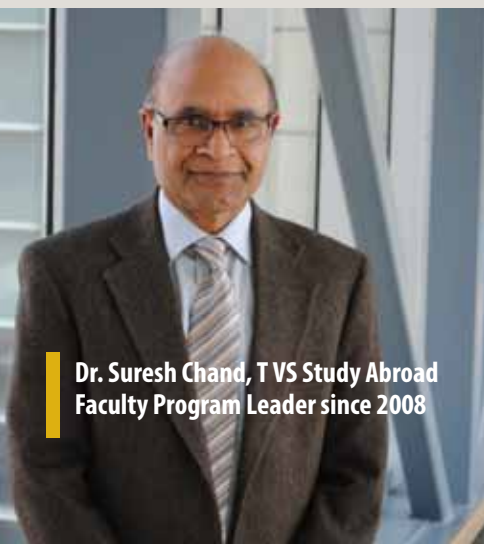
PROJECT OBJECTIVE: Development of implementation road map of AR/VR and MR for entire plant operations , includes detailed study of pilot area and scale up plan

STUDENTS: Xiaoli Gao (MSHRM), K. Dahliwal(MBA)

PROJECT OBJECTIVE: Consumers are the center-stage of great marketing companies. In order to influence consumers we must understand their needs, expectations, and buying behavior. The goal is to see if there are any rules that the company can decode and classify in order to help segment the market for better targeting of their brands.

STUDENTS: P. Perumareddy (IE)

PROJECT OBJECTIVE: Improving utilization of TVSM vehicle handling system



**Dr. Suresh Chand, TVS Study Abroad
Faculty Program Leader since 2008**

"TVS program enriches students' overall academic experience at Purdue by exposing them to various functions on TVS's value chain, including Product Design, Human Resources and Leadership Development, Operations, Logistics and Supply Chain Management, and Customer Relations and Marketing Management, under guidance of highly qualified mentors in a global learning environment. Students, working in small teams, get to apply what they learn in the classroom to practical problems with real-time feedback from clients. It also enriches students' cultural experiences. Students live a vastly different way of life for three weeks – life full of both joys and challenges. Students develop life-long friendships with each other and with hosts in India. Overall, a time- and cost-efficient, high-value, life changing experience in a global environment."

“ Do more than **YOU** can.”

Originally from the closed town of Sarov, Russia, Dr. Olga Senicheva started teaching at Purdue in August 2016. Describing her time here so far, Olga reflects on her most satisfying moments as an instructor, “moments when you can sense that you have a connection with the students- to be able to sense that they get it.” As an instructor it’s important to know that you are reaching your students, engaging with them, and helping them reach their goals.

“You never know what to expect from students.”

She describes watching them learn, sometimes fail, but giving them the opportunity to work through things as one of the most satisfying things about working with students. Part of that learning comes through real-world out of the classroom experiences which are vital in preparing students for full time work. Olga, who currently assists with center projects, sees

the invaluable experience offered to the students through GSCMI projects and events. The center offers professional industry interaction, deadlines, and results from teamwork. Collaboration is key, and Olga mentions the unique opportunity that GSCMI projects offer through interaction with other faculty members and students on a regular basis. Olga currently assists with the Proctor and Gamble project facilitated by GSCMI. Regarding her research interests, Olga focuses on inventory

Olga reflects on her view of pushing yourself in everyday life and the importance of working as a team- “Do more than you can.”

management which was her PhD focus while studying in Hamburg, Germany. Looking forward, Olga perceives she may pursue further research related to agricultural supply chain development as

agriculture is such a vital part of the Midwest. When Professor Senicheva is not teaching or researching, you’ll probably find her in one of three places- with a suitcase or book in hand or on a yoga mat.

A portrait of Olga Senichiva, a woman with long dark hair, smiling warmly. She is wearing a blue textured blazer over a black top and a gold necklace with a pearl pendant. She is holding a white coffee cup. The background is blurred, suggesting an indoor setting. A yellow vertical bar is on the right side of the image.

OLGA SENICHIVA

Krannert Faculty &
GSCMI Project Lead

BRIDGING INDUSTRY, STUDENTS, & FACULTY.

FACULTY

CONFERENCE RECAP

SMART PLANNING HELPS COMPANIES MINIMIZE DISRUPTIONS

When Hurricane Katrina hammered the U.S. Gulf Coast in August 2005, it caused massive flooding in New Orleans, displacing more than one million people and forcing most businesses to close. The Folgers coffee plant, then owned by Procter & Gamble, was the first major industry in New Orleans to reopen after the hurricane, becoming operational within three weeks. A management decision to focus on helping employees enabled the plant to recover quickly. The company offered employees \$5,000 interest-free loans and temporary housing near the plant, among other benefits. "They took care of the employees the first thing," said Sergio Barbarino, a research fellow of Procter & Gamble Research and Development, speaking at the annual conference of the Global Supply Chain Management Initiative (GSCMI) in Purdue Memorial Union. "The employees stayed, instead of being relocated somewhere else, because the company completely took care of them." The Folgers plant also received assistance from suppliers and even competitors. "They went out of their way to help us," Barbarino said. He and other speakers at the recent conference, entitled "Supply Chain Risk – Business Continuity Planning," shared real-world examples of how organizations have responded successfully to natural disasters and other unplanned events,

minimizing disruption through risk-management and planning. "Business continuity planning is probably one of the key components of our business," said Sriram "Srisu" Subrahmanyam, Senior Vice President of Business Transformation for KAR Auction Services. "It's not just a service but it's a product that we offer to our insurance providers and they hold us accountable to deliver on an annual cycle." He recounted how the Carmel, Indiana-based company was able to allocate resources quickly during Hurricane Harvey last August, recovering and selling tens of thousands of damaged vehicles. The company deployed about 900 tow trucks from 35 states to the Houston area within four days. **"You cannot avoid the disruption, but you can plan so that you can react really fast and minimize any kind of cost overruns or resource limitations that you may have – and do it better than anyone else can,"** Subrahmanyam said. Maria Crowe, former President of Manufacturing Operations at Eli Lilly, recalled how another 2017 hurricane, Hurricane Maria, disrupted operations at the Indianapolis-based pharmaceutical company's insulin plant in Puerto Rico. "The group there was very well-prepared," Crowe said. "Their reaction to the hurricane was very fast. We had the plant up and running within two weeks after the storm." The hurricane caused a power blackout that turned the island into a cash economy, as credit card networks were cut off. Fortunately, the Lilly plant had an on-site credit union with a well-stocked ATM that worked on a

back-up generator, an enormous benefit to employees. "There is nothing more critical in any of our businesses than the people," said Crowe, who spent 35 years at Lilly. **"I don't care what facility you have, how much money you have, what products you have, if you don't have people who are capable and can get to work safely and go home safely, you really don't have anything at the end of the day.**" The safety of the employees in Puerto Rico was our No. 1 concern." Professor Ananth Iyer, GSCMI Center Director, shared examples of how the United States Coast Guard and other organizations responded effectively to unexpected events. The Coast Guard rescued 33,500 people following Hurricane Katrina, deploying 26 cutters, 38 helicopters, 27 aircraft and 119 boats. More than 5,600 Coast Guard men and women participated in the rescue effort. Well-prepared for the disaster, the Coast Guard was able to move its assets out of the hurricane's path and then move them back for the rescue effort. The organization also reprioritized its tasks nationwide to respond to the disaster. The Coast Guard's flexibility and agility helped keep its costs under \$20 million. "Because they just reshuffled the tasks they did, at the backend it did not increase costs that much," Iyer said. Gary Henriott, chairman of the Henriott Group, a Lafayette-based company that provides insurance, risk management and consulting services, outlined the steps companies can take to evaluate and manage risk in their supply chains. While risk management takes time and money, the

benefits are considerable, he said. Among them: keeping a business running and maintaining product quality. "To me, the most important thing is the reputational impact," Henriott said. "We all have reputations as corporations. That's why we're working together. That's why I'm a part of your supply chain and someone else is a part of mine."

The challenge for a lot of companies is finding the money to anticipate risk and "get ahead of it," said Tom Sanger, Director of Intel Corporation's Supply Chain Transformation. What worked at Intel was producing a 10-year growth plan that showed where the company was headed and the risks it faced. "Being able to get the risks tied to the actual business growth plan was key," Sanger said. Cindy Farrer, Vice President - Global Supply Management at Allegion, and Timothy McDonnell, Director of Global Supply Strategy and Risk Management at Allegion, described how the company addresses risk in its supply chain. Allegion, which provides security products and solutions, evaluates supplier risk through two scorecards: a performance scorecard and a risk scorecard. The scorecards serve as tools for commodity managers as they strive to improve supplier performance. "They can have a good conversation about risk and what it means to our company," McDonnell said.



MARIA CROWE, Former president of manufacturing operations, Eli Lilly



2018 GSCMI SPEAKERS:

SERGIO BARBARINO

Research fellow of *Procter & Gamble Research and Development*

ANANTH IYER

Senior Associate Dean
Susan Bulkeley Butler Chair
in Operations Management,
Purdue University

TOM SANGER

Director of Supply Chain
Transformation
Intel Corporation

SRIRAM (SRISU) SUBRAHMANYAM

Senior vice president of
business transformation for
KAR Auction Services

MARIA CROWE

Former president of
manufacturing operations
Eli Lilly

GARY HENRIOTT

Chairman - *Henriott Group, Inc.*

TIMOTHY MCDONNELL

Director - Global Supply
Strategy and Risk
Management
Allegion, PLC

CINDY FARRER

Vice President - Global
Supply Management
Allegion, PLC



INTERCOLLEGE CASE COMPETITION

The GSCMI Center at Krannert School of Management, Purdue University hosts the annual Intercollege Graduate Case Competition. The competition consists of two phases: Phase 1 serves as a virtual qualifying round, and Phase 2 (involving the top 6 qualifying schools from Phase 1) occurs in conjunction with the GSCMI Spring Conference at Purdue University. These 6 teams will have the opportunity to showcase their skills and knowledge to conference industry judges.



CONGRATULATIONS PHASE 1 QUALIFIERS:

University of Arizona
 MIT Sloan School of Management
 University of Southern California
 IIM Raipur
 University of Michigan
 University of Maryland
 Purdue University

CONGRATULATIONS FINAL ROUND WINNERS:

1st: University of Southern California, Marshall School of Business

2nd: University of Maryland, Robert H Smith School of Business

3rd: University of Michigan-Tauber Student Group

OUR PROJECTS

The center has a vast variety of manufacturing and supply chain related projects provided by companies for work to be done by our students and faculty.

PROCTOR & GAMBLE PROJECT OVERVIEW

The European Union grant offered faculty, students and staff a great opportunity to work with Procter and Gamble on projects that included business continuity planning with suppliers, manufacturing synchronization and container visibility optimization. Each of these projects was driven by detailed data and contracts and focused on generating quantitative estimates of the impact of optimizing the system and maximizing impact to the supply chain.

The Business Continuity project was led by Professor Gemma Berenguer. The simulation models for production were led by Professor Olga Senicheva. The manufacturing synchronization and container visibility projects were led by Professor Ananth Iyer. The goal of the synchronization effort was to produce all required orders on a weekly basis i.e.,

get to a goal of 100% weekly synchronization. But there were some key issues to consider, from differences in packaging, to differences in formulation to line production constraints to forecast variability. In addition, there were setup times that had to be kept track of as production shifted across products. With intense collaboration with P&G managers, and data at a highly granular level, the team produced a mathematical model to optimize the system that permitted both 100% weekly synchronization as well as a close to 5% projected reduction in capacity required. The project provided a great learning experience and will appear in various forms, from class exercises to cases to academic papers in future years. The container visibility project involved a visiting faculty member from Turkey, Professor Cagri Haksoz, and Ananth Iyer. They applied ideas from their

past methodological papers to the estimation of the optimal way to use container visibility to improve the supply chain. Their results suggest that waiting to gather data so that it helps in the choice of contingent actions may be preferred to acting too early. Similarly, the decision of when to get this information may depend on how significant the cost of delay is to the system and how expensive the cost of taking corrective steps to remain on schedule. The container visibility project's results are expected to be used to understand the economics of different tracking schemes for global container flows.

OUR PROJECTS

PROCTOR & GAMBLE BOTTLENECKS

P&G was struggling to synchronize its detergent pods production to meet its current demand. They planned to either make capital investments for expanding their production capacity or optimize their existing production. The latter has been explored as a project by P&G with DCMME to make a small yet effective investment towards this synchronization problem. Initially, the team had

first identified bottlenecks in the production process and explored the WIP inventory implications as an effect of shifting the bottleneck to achieve continuous production. This provided uniform running of the production with the least number of changeovers. Later, a linear programming optimization model was created to generate weekly production schedules such that,

inclusive of all the changeover times, the total duration of production was minimized. The model created is being cross validated with different line loading scenarios to come to the most optimal solution to this production issue.

PROCTOR & GAMBLE SYNCHRONIZATION

The P&G Project with Professor Senichiva and Dr. Iyer was initiated to find efficiency gains in the production processes of washing pods manufactured by P&G. The project was divided into four phases: Data clean-up, data analysis, applying agile methodologies, and JaamSim (a simulation software). Data clean-up involved different types of data in various formats that was collected

from P&G. Macros were then developed to extract relevant data in specific formats to be analyzed. Next data analysis involved production logs being analyzed to find any trends or gaps in the production processes by checking production units, production time, and capacity utilization. Agile methodologies were then utilized to see if any changes in production processes

could provide any efficiency gains. Finally, JaamSim (a simulation software) was utilized throughout the project to visualize the production processes and find any improvements that could be made in the future.

CENTER'S INTERNATIONAL PRESENCE

- South America
- North America
- Europe
- Africa
- Asia
- Australia

- Company student projects
- International internships
- Graduate student assistants
- Scholarships
- Conferences
- Training courses

Bridging industry, students, and faculty around the globe through projects, conferences, and education.

WHIN SUPPLY CHAIN PROJECT

The WHIN Supply Chain Leakage project is looking for a solution to identify the leakage in the supply chain in the 10-county region for manufacturing companies. The team is collecting information about the parameters that can help identify a supplier or vendor. The three key points that need to be understood are what certifications a company has,

whether the company is a retailer/ manufacturer/ distributor, and finally the equipment that the company possesses. As of now, the focus is on getting data for the 80 companies through web scraping, and then the process will be replicated for all remaining websites. All of the data will be put into a searchable database.

WHIN EDUCATION PROJECT

WHIN Education has built a network of company representatives interested in providing research to develop a global epicenter for agriculture and next-generation manufacturing empowered by smart "Internet of Things" platforms. The team is in the early stages of company interviews and has spread

the word through interactive group sessions and a WHIN launch event. In April, WHIN offered a pilot training session, where the team helped to address technology and education issues companies may be facing.

OUR PROJECTS

INDOT SHELTER PROJECT

The INDOT Shelter project involves evaluating INDOT's expected return on investment to create covered areas for equipment (vehicles and other assets) and identify alternative ways to create covers for equipment and all the associated costs. Currently, we are collecting data on INDOT's equipment from publicly available records. Using the data, we intend to calculate the

payback period of the equipment and compare it to the cost of constructing shelters. Furthermore, the team plans to project the impact of enclosures on equipment maintenance cost and performance, develop management strategies for equipment need and usage across districts and impact, and benchmark districts against each other to understand best practice. Lastly, the

team plans to adjust management incentives to solve the agency problem. At the end of the project, the team presented their findings to INDOT and made recommendations based on the analytical and financial analysis done above.

INDOT P3 PROJECT

This project is an after-action review of the overall profitability and success of the collaborative effort of Indiana and Kentucky in developing the Ohio River Bridges Project. Indiana decided to fund its portion of the project by utilizing a Public-Private Partnership, or P3, approach with WVB Partners. There are multiple forms of P3 structures; the Ohio River Bridges Project is Design-Build-Finance-Operate-Maintain (DBFOM) in which the private entity is responsible for the entire construction of the bridge, financing the costs, as well

as operating and maintaining the bridge over a specified period of time. The primary benefits of utilizing this option are improved life-cycle costs, improved timeline, and reduction of risk and liability. The team has worked to research and develop a present value analysis of the project by analyzing the funding structure of both INDOT and WVB Partners. They created a toll revenue projection model reflective of current traffic patterns that they also integrated into the overall funding structure. Currently the team is

working to create a model to predict the operations and maintenance cost of all bridges involved in the project. Upon completion they will utilize this model in their comparison of the profitability of each party involved in order to quantify the gain or loss seen by INDOT by implementing the P3 structure. This project will move onto analyzing the economic impact and other additional factors affecting the overall evaluation of the bridges' profitability.

INDOT ECONOMIC DEVELOPMENT PROJECT

In the INDOT Economic Development project, the project work is progressing as per the schedule and the team has completed mapping of I-65 and I-70. The mapping includes gas stations, restaurants, rest areas, emergency shelters,

truck parking spaces and motels. Moreover, progress has been made on completing the same for I-64 to I-94. Data comparing Federal vs. State owned roads has been compiled. Data on green space from the state tax department has been acquired

which will form the base for filtering out state owned green space. This project is in its early stages, and much more data will be compiled in the future.



Student graduate assistants and center project leads.

ADVOCATE HEALTHCARE PROJECT

Advocate Health Care, a leading healthcare services provider in Illinois, has 10 Medical centers where it wanted to reduce inventory costs and associated expenses in addition to eliminating expired product count in these medical centers. This task was challenging because of the necessity of these products for an individual in a hospital and due to the high costs associated with these medical products. Optimizing the inventory levels for improved efficiency and effective cost management proved to be one of the most important focus points for Advocate. The initial approach was to establish and implement a durable Requisition Infrastructure

and improve the receiving processes by adopting Standard Operating Procedures (SOPs) for receiving the inbound freight and standardizing the receipt verification process. As this gave a better understanding of how the flow should be initiated, the team moved over to redesign the layout of the dock to accommodate the recommended changes. They used AutoCAD and SketchUp extensively to render and create 2D and 3D drawings of the layout for 4 critical centers and ran simulations in JaamSim to predict the improved turnover times. The main objective was to implement and improve metrics at the 4 critical centers first and then do a site-by-site analysis

to suggest changes depending on the current state of the center. The project team also leveraged a lot of available data to gain insights and make better decisions with respect to the inventory reorder points and quantity. The project team comprised of individuals from Industrial Engineering, Global Supply Chain Management, Data Analytics and Business Management majors.

(STARTING AT TOP,
LEFT TO RIGHT)

GEMMA BERENGUAR

TOM BRUSH

SURESH CHAND

AMY DAVID

ANNABELLE (QI) FENG

GREG HUNDLEY

ANANTH IYER

JUSTIN JIA

KARTHIK KANNAN

ELLEN KOSSEK

YANJUN LI

YAROSLAV ROSOKHA

OLGA RUSYAEVA SENICHEVA

GEORGE SHANTHIKUMAR

SUSAN WATTS



KRANNERT FACULTY

We are grateful to the many faculty at Krannert who participate in Center sponsored events, projects and research. Thanks to each one for their efforts to progress the scholarly works in Operations and Global Supply Chain Management.

ADVISORY BOARD

ROY VASHER

ROBERT NIDA

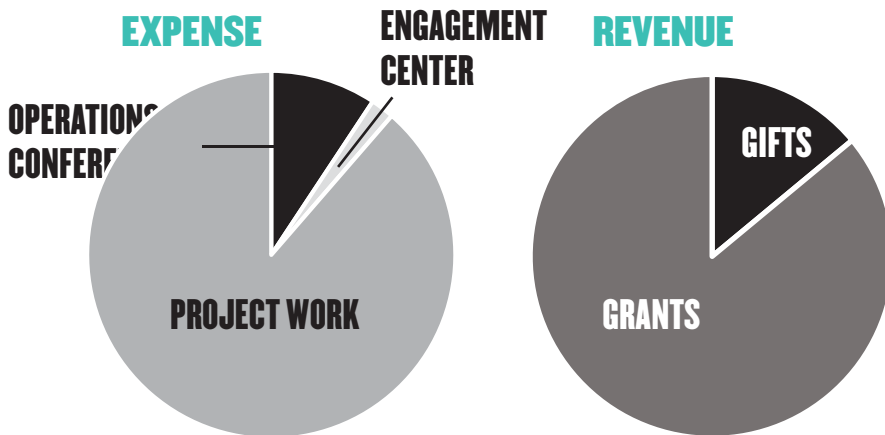
ANGUS MCLEOD

OUR PARTNERS

AMERICAN AXLE &
 MANUFACTURING
 ARCELOR MITTAL
 CATERPILLAR
 GENERAL MOTORS
 JOHN DEERE

BRIDGING INDUSTRY, STUDENTS AND FACULTY.

For ten years the GSCMI (Global Supply Chain Management Initiative) Center has been the focal point within the Krannert School of Management for promoting education, research and industrial engagement with those interested in supply chain management. The Center accomplishes this through various conferences, student competitions, and company projects that create venues for collaboration between firms, students and faculty across the state and around the globe. Bridging industry, students and faculty.



CONNECT WITH US

DR. ANANTH IYER
DIRECTOR
 AIYER@PURDUE.EDU

STEVEN DUNLOP
MNG. DIRECTOR
 DUNLOPS@PURDUE.EDU

HEIDI ALLWES
CENTER COORDINATOR
 HALLWES@PURDUE.EDU

PURDUE
K R A N N E R T
SCHOOL OF MANAGEMENT

765-494-7800 | gscmi@purdue.edu | gscmi.org