Global Operations Capstone – SCO 6292. The signature course for the MS in Supply Chain Management (MS SCM) program at Carlson School of Management, University of Minnesota. The capstone course is an experiential learning project that brings all of the MS-SCM program learning to life for the students on a real-world project for an external client.

All capstone course projects aim to have three components: Global, strategic, supply chain-orientation. These are the core tenets of the MS SCM program that the capstone course is intended to highlight.

Students in the capstone course work for 500+ hours over the duration of 10 weeks each summer on a consulting-type project for an external client.

The students are supported by a professional director with significant industry experience, academic faculty who serve as subject matter experts, and other relevant resources of the Carlson School of Management and the University of Minnesota.

Projects cover much of the end-to-end supply chain, with topics ranging from market entry to warehouse rationalization.

NOTE: Capstone course project work is considered confidential to the client. The following are sanitized--abbreviated descriptions of projects:

Market Entry: Our client is a mid-sized consumer products company that currently operates only within the United States, and is considering global expansion. The client has witnessed the retreat of several global market entries of other retail firms due to supply chain issues. To avoid this outcome, our client commissioned a project to evaluate the supply chain environment for several locations, then use this research to inform a global market entry recommendation for each site. The student-team defined what constituted supply chain elements for consideration, then evaluated multiple locations according to this rubric.

Recommendation: The student-student-team evaluated and created a prioritized list of three market entry locations across North America and Europe according to supply chain considerations.

Supplier Assessment: Our client is a mid-sized industrial goods manufacturer. In the past year, our client has had two sole suppliers who were unable to fulfill their supplier roles due to supplier risk events (e.g., bankruptcy, etc.). These risk events adversely affected our client's production abilities. The client asked Supply Chain Solutions to create a supplier assessment tool that would effectively measure the health of their supplier base in an immediate and ongoing basis. To create an effective tool, our student-team conducted research to identify leading practices in supplier assessment, and determine which were most applicable to our client.

Recommendation: The student-team used their research findings to create an initial Excel-based supplier assessment tool that addressed three levels of partnerships. The team then recommended an implementation plan for piloting and training on the tool in the production environment.

Inventory Reduction: Our client is a global medical device company that is seeking to reduce global inventory by 20%. Our Supply Chain Solutions student-team conducted extensive primary and secondary research to create 16 ideas for inventory reduction by the midpoint, then focused on 8 of these ideas for the second half of the project. The team continued to flush out these specific inventory reduction ideas in concert with the current state of our client's process/approach, and determined which were viable for implementation.

Recommendation: The student-team recommended eight inventory reduction techniques that when combined, reduced global inventory by 23.4% in the upcoming 5 years.

Warehouse Network Optimization: Our client is a global industrial goods company who has one division that needs products to be distributed from a U.S. manufacturing facility to a set of global warehouses. The client asked our Supply Chain Solutions student-team to create a model to identify how to simplify this global warehouse network, while maintaining efficiency and efficacy of the supply chain. The team created three models to accomplish this task: a financial framework, a warehouse optimization model, and an outsourcing model.

Recommendation: The student-team recommended the closure of 35% of global warehouses for this division. Although this resulted in an increase of average lead time from the closed sites by two days due to increased distances, the financial model highlighted that this lead time impact was within the acceptable client service range, and resulted in $1M+ in annual savings. The team also recommended that when piloting warehouse consolidation, that the client also conduct outsourcing analysis for specific regions globally.

Market Entry: Our client is a mid-sized consumer products company that currently operates only within the United States, and is considering global expansion. The client has witnessed the retreat of several global market entries of other retail firms due to supply chain issues. To avoid this outcome, our client commissioned a project to evaluate the supply chain environment for three Asian locations, then use this research to inform a global market entry recommendation for each site. The student-team defined what constituted supply chain elements for consideration, then evaluated locations according to this rubric.

Recommendation: The student-team evaluated and created a prioritized list of three specified market entry locations across Asia according to supply chain considerations.

Supply Chain Commercialization Strategy: Our client, the McKnight Foundation, has interest in facilitating the commercialization of the Kernza grain. This is a perennial grain developed by the Land Institute in Kansas that has strong environmental benefits, including prevention of soil erosion, nitrate runoff, etc. Kernza could be a potential substitute for wheat, however, the grain kernels are much harder and smaller, requiring new milling equipment. The student-team was asked to: (i) understand the current state of the limited Kernza supply chain, and (ii) identify approaches to bring Kernza production to commercialization.

Recommendation: To achieve commercialization, the student-team recommended a phased approach that involved knowledge sharing on how to grow Kernza effectively across constituents, investments to achieve scale and increase yield, and emphasizing quality through implementing grading systems by varietals in the market.

Inventory Reduction: Our client is a multinational industrial goods manufacturer who began the project interested in cycle stock reduction. The student-team was to begin with an analysis of the current state of cycle stock across three global plants, and to identify opportunities for inventory reduction. In the first half of the project, the team found that there were significant data issues and definition discrepancies which meant that team would not have the ability to create a cohesive, cross-location cycle stock assessment. During the second half of the project, the client and the student-team agreed to have the team pursue a cross-industry leading practices evaluation of inventory reduction.

Recommendation: The student-team developed a 5-pillar framework to optimize inventory, across a foundation of data strategy, led by a global supply chain Center of Excellence.

Distribution Network Optimization Strategy: Our client is a global medical device company that is seeking to optimize the distribution network of products in one division. In order to do so, the client asked our student-team to focus on the product flow of three high-revenue generating product lines and determine how to optimize distribution efficiency. The student-team mapped the product flow of these three product lines, identified leading practices in distribution network optimization, and developed a strategy for our client to increase the distribution efficiency of these products.

Recommendation: The student-team recommended four benchmarked approaches to optimize product flow and will yield increased distribution network efficiency.

Commercial Shipping Strategy: Our client is a multinational industrial goods manufacturer who has conducted many acquisitions over time, resulting in myriad shipping approaches across divisions. These varying approaches result in increased transportation costs for the organization. The sales team is reticent to change shipping approaches, thus the proposed strategy needs to anticipate customer response. The scope was limited to outbound commercial shipments in North America. The student-team conducted internal interviews across multiple divisions to identify the current state, conducted external interviews to identify cross-industry leading practices in shipping strategy, found detailed company-specific external shipping policies across multiple organizations, and conducted secondary research in the shipping field, as well.

Recommendation: The student-team identified an overarching strategy incorporating policies and governance with regard to shipping, then outlined four key areas of recommendations within these policies based on leading standards.

Supply Chain engagement in the circular economy: Our client is a large consumer foods / agribusiness company who was seeking an evaluation of opportunities and strategies to engage in circular economic models. Various options/ideas are appearing in consumer packaged goods and industrial applications across the globe. The company wanted an independent evaluation of options that would be part of their strategy to engage in these types of activities that would enhance its customer acceptance and growth opportunities.

Recommendation: The team consulted experts and researched numerous methods to identify 12 potential approaches that fit within the client's businesses. Further evaluation was performed including contacts and

dialogues with potential partner organizations to narrow the client's options to two key strategies for the company. As the project was underway, the client created a new senior manager position who will take the team's recommendations forward through implementation.

Finished Goods Inventory Optimization: Client is a mid-sized industrial goods manufacturer that seeks an evaluation and plan to improve customer service levels and optimize inventory at eight North American finished goods locations.

Recommendation: Team did detail review, mapping, and historical data analysis of the current process. Findings included numerous process changes necessary, recommendation about resources and structure, KPI's, and standardized Plan for Every Part (PFEP) models. In conjunction with the SCS team's work and recommendations the client reorganized its inventory management resources to address and implement the SCS team's plans.

Supply Chain KPI's and Data Management: Client is a large consumer goods manufacturer with a global supply chain that is seeking to implement a world class set of supply chain metrics and a supporting data strategy to support its strategic decision making and organizational evolution.

Recommendation: The SCS team did considerable research and consulted experts on best practices across similar organizations and recommended a KPI framework that supports global strategic decision making and management for the supply chain. The team also mapped the existing data sources within the current ERP/financial systems at the client to provide a roadmap and identify gaps or barriers to implementation. The provided implementation plan also included a recommended statistical model to evaluate and fine tune the metrics to ensure they have high validity for the company's results.

Supplier Risk Assessment: The client is a mid-sized global supplier of medical device components. Senior supply chain leadership recognized that supplier risk analysis and management across its global supply chain was not standardized creating significant risk of supplier related disruption in customer service.

Recommendation: The SCS team did significant research into best practices in evaluating and managing supplier risks and recommended a standard evaluation model to the client. The model was created to link to existing data sources and provided standard data analytics and data visualization tools to enable procurement management to reduce supply base risks. Also, the team delivered a comprehensive set of documentation and standard work procedures to ensure that the risk management tool will be an enduring process for the company.

Supplier Direct Fulfillment: The client, a large retailer, sought to evaluate its current process of fulfilling customer orders via a supplier direct channel including understanding customer experience, financial performance, and current organization/resource structure.

Recommendation: The SCS team did customer experience and vendor process benchmarking across similar sized organizations and provided insights and recommendations to the client about its current approach. Customer experience data was viewed using sophisticated data analytics to provide significant insights into customer perceptions about the current processes. Internal processes, resources, and vendor/partner relationships including contracts were mapped and evaluated along with financial metrics. Team recommended an organizational approach, process improvements, KPI's, and vendor/partner enhancements to drive this segment towards growth and improved profitability. In conjunction with the SCS teams work, the client created a new senior director position to be accountable for management of this segment and implementation of the team's roadmap.

Establish Digital Kanban System: Our client was a global producer of medical devices. Client desired driving production level efficiencies by implementation of a digital Kanban system. Team examined things from both a data and process flow examination in coming up with recommendations.

Recommendation: The team established a new and improved inventory pick flow. It found that 20 items of items accounted for 88% of the demand. These items were physically relocated to reduce pick movement by over 85%. Additionally data was examined to establish both optimal replenishment and repurchase points. The team left behind a process and procedure for leadership to periodically review and revise the Kanban system.

Examine Impact of Covid-19 SCM Policy Changes: Our client was a global consumer retailer. In response to Covi-19, the client implemented several SCM policy changes. The client wanted to evaluate the impact of these policy changes, understand what other policy changes have been implemented in the marketplace and have recommendations on current and future SCM policy changes.

Recommendation: The team focused its data analysis of the impact around policy changes around a specific SKU set identified by the client. Additionally the team looked at policy changes implemented both by competitors and identified companies from the client. Recommendations included: type & location of fulfillment centers, levels of inventory, uses of new & evolving technologies / strategies, and strategies involving 3PL providers.

E-Fulfillment Channel In Covid-19: Our client was a distributor of consumer product goods in the beauty and bath space. The client had experienced a dramatic shift in demand as a result of Covid-19 from brick and mortar retail to consumer direct e-fulfillment channels. This rapid, dramatic shift created many challenges for the client. They sought specific guidance regarding where the direct demand was geographically and what 3PL e-fulfillment providers should be engaged to best deliver product.

Recommendation: The team provided insight into the geographic e-fulfillment demand by creating and analyzing patterns in several heat maps. Regarding recommendations for e-fulfillment providers, the team created an in-depth, detailed, weighted decision matrix covering multiple providers across multiple criteria. The result of these recommendations allowed the client to move forward with a more robust, effective direct to consumer strategy.

ROI Modeling for RFID Solutions: The client is a producer of RFID hardware / software solutions to improve inventory tracking.   The client had a need to develop a robust ROI model that could be used in the selling process to better articulate the value add of their solution from both a topline revenue and bottom line cost standpoint. The model needed to be specific for a current client, yet flexible for use with future clients.

Recommendation: The team worked not only with the client but the client's customer to develop a robust ROI model. Additionally, adding further credibility to the work, the team consulted with a national ROI modeling expert in this space in the creation of the model. The team illustrated how accurate, granular inventory data at the retail level can drive better processes and decision-making - including reductions to inventory, better forecasting, higher service levels, and decreased labor costs.

Free Trade Zone (FTZ) Optimization: The client, a large consumer goods manufacturer, desired to optimize the use of its free trade zones. They desired a deep dive analysis, cost saving recommendations, and a process playbook to implement changes and manage the FTZ.

Recommendation: The team, working hand in hand with the client, provided recommendations for over $3M in FTZ optimization savings. Through extensive data and process analysis the team looked at current FTZ utilization and both tariff policy and tax law to formulate recommendations. Additionally, the team left behind an extensive playbook for the client to manage the process on-going, examine future sourcing opportunities, and leverage the recommendations into other divisions.