ZLC | MIT GLOBAL SCALE NETWORK

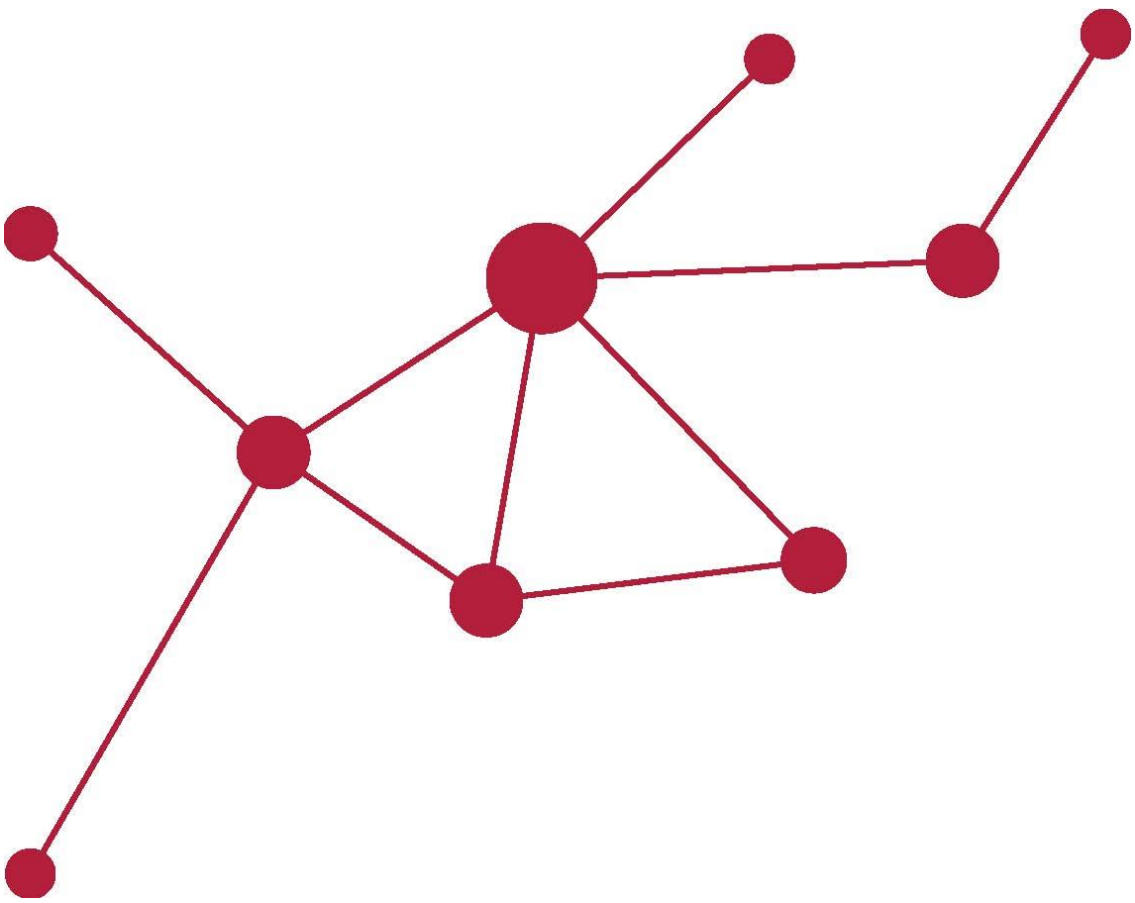
TALENT HUB FOR SUPPLY CHAIN

Zaragoza Logistics Center

ZARAGOZA ACADEMIC PARTNERS

Guide 2020-2021

ZLOG



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Background and General Information

The MIT-Zaragoza International Logistics Program is a partnership between the MIT Center for Transportation and Logistics (CTL) and Zaragoza Logistics Center (ZLC), a research institute associated with the University of Zaragoza in Spain. Established in 2003, the MIT-Zaragoza program develops world class education and research in logistics and supply chain management. The MIT-Zaragoza program offers graduate and executive education in English, outreach events, and industry partnerships. For more information, see www.zlc.edu.es/zlog

The MIT-Zaragoza **Master of Engineering in Logistics and Supply Chain Management (ZLOG) Program** is a ten-month course of study based on the MIT curriculum that has been top ranked in Supply Chain and Logistics for several years in a row by US News & World Report and number one by Eduniversal for four consecutive years. In addition to developing analytical and leadership skills through a strong curriculum and extensive industry interaction, ZLOG students gain valuable international experience by studying in a diverse classroom environment at Zaragoza Logistics Center in Spain.

In 2008 the master thesis sponsor relationships were formalized and the Zaragoza Academic Partner (ZAP) program established. 41 Companies have participated in the ZAP program to date:

Each student of the ZLOG Program is required to complete a Master thesis to obtain their degree. The ZAP program is designed to benefit both the students and the sponsoring companies. Students benefit by being able to work closely with professionals on a real-life supply chain environment. Companies benefit by having a student team bring new insights and approaches to current supply chain challenge or opportunity and having an exposure to talent with no commitment.

Other benefits of joining ZAP:

- **Student Recruitment**: Get priority access to highly qualified and in-demand supply chain professionals.
- **Global Supply Chain Research Forum**, with Thesis projects presented at Research Fest, an opportunity for networking and discussing the latest supply chain research trends.
- **ZLC Executive Education**: Get priority access to ZLC open programs and benefit from a 15% discount.
- **MIT Global SCALE Network**: Expand your network on the worldwide coverage and across all industries.
- **Events**: Engage in summits, symposia, workshops, conferences, seminars and roundtables organized by ZLC.
- **MIT Global SCALE Newsletter**: Be kept informed of the news and events.

Process and Timeline

The master´s thesis project follows the academic calendar with the projects starting in October and finishing in May. The cost for the project is 12,000 €. 50% Discount will be applied for second and following projects, as well as for first time collaborations.

The first step for a participating company is to select a project topic and assign a project lead to act as the main point of contact. Section 4 of this document provides some guidelines on project definition. MIT-Zaragoza faculty members can work with companies during the summer to help define the project scope and description. ZLC will provide a project scope document (template is available on page 9 of this document and an example on page 10) to summarize the project. This project scope document should be completed by August 15th, 2020.

During orientation in August, the students receive the scope documents for each of the potential ZAP projects along with additional thesis topic ideas provided by faculty members. We encourage companies to present their project in person and meet with the students. Unfortunately, due to the current circumstances, this year we propose remote presentations and interviews. We have set aside the week of September 14th for these project presentations. These presentations and interviews can also give your company a head start in the recruiting process. Late September the students bid on the projects and, based on the preferences of both students and companies, thesis projects, student teams and academic advisors are assigned. ZLC commits to assign at least one of the companies´ preferred candidates, as long as the project has been ranked in the top 50% by the candidate.

The kickoff meeting to formalize a project plan and define resource requirements should occur at the beginning of October. Throughout the fall semester, the student-company team will meet periodically to complete the problem description and begin data collection. Additionally, students will conduct a literature review on the problem using MIT´s research libraries and other resources. A formal thesis proposal with any preliminary analysis is submitted by the students at the end of December.

As of February, the students have more time to work on their research projects and can more easily spend some time on site (if needed). Any travel expenses must be covered by the sponsor company. Throughout the winter and early spring, the student will meet regularly with the company team to review their analysis and interim results. The projects wrap up mid-May and all students will present their thesis results at the ZLOG Research Fest on May 31st 2021 in Zaragoza. All partner companies are welcome to join the event.

The thesis project is an academic requirement for the ZLOG students and must be completed by the deadline in order for the student to graduate. The timeline for these projects for the 2020-2021 academic year is as follows:

DATE	TOPIC
June - July	Identify project scope
Aug 15	Submit final project scope document
Week of Sep 14-18	Thesis Project Presentations to the ZLOG class by the partner companies
Oct 2	Finalize student-project matching (2-3 students per project)
Oct - April	Project work with regularly scheduled meetings
TBC	Research Expo in MIT CTL facilities, Massachusetts (date to be confirmed)
May 14	Final Thesis due
May 21	Final Executive Summary due
May - June	Final presentation to partner company – date and format to be jointly agreed
May 31	ZLOG Research Fest in ZLC facilities, Zaragoza

Deliverables

As part of the project, each student team provides the following deliverables to their sponsoring company:

- Final thesis report.
  - This is also turned into the Zaragoza Logistics Center for credit and grade.
- Final presentation to sponsoring company on results and conclusions.
  - This is in addition to the ZLOG Research Fest and can be held at the company´s location in late May to early June to share the results with a larger audience.
- Executive summary of the research project.
  - This is a 2-5 page summary of the research project that is suitable for wider distribution within the sponsoring company.
- Powerpoint slides from the Final Presentation.
  - These are the slides used during the ZLOG Research Fest.

The partner company needs to commit to the following:

- Payment of 12,000 € fee for the project,
- Assignment of a Single Point of Contact to act as project lead able to meet regularly (in person or virtually with the team),
- Access to data as needed in a timely fashion,
- Payment of any travel expenses to partner company site or out of Zaragoza due to project needs.

The master thesis is a publicly available document, although there is a preestablished mechanism by which ZLC ensures partner companies confidentiality.

- Non-Disclosure Agreement between ZLC and students so that all commit to keep confidentiality on the company data used for running the project.
- A confidentiality clause is included in the ZAP contracts between partner companies and ZLC.

Since students need to include enough detail and context to satisfy academic thesis requirements, there are some options that partner companies can request in order to protect their data:

- Disguising the name of the company,
- Not publishing certain cost figures,
- Providing ranges for relevant numbers, and
- Randomizing numbers to provide the gist of the analysis, but not allowing back calculation of confidential information.

It is the responsibility of all members in the team to plan for such an option and conduct a submit/review process in a timely manner to meet the thesis deadline.

Defining a Good Project

Based on experiences with master´s thesis projects, we have found that successful projects share three main characteristics: a focus on answering a question, a research rather than a consultative orientation, and timely access to data and required personnel.

First, they all focused on answering a tightly defined question that is of interest to not only the sponsoring company, but also to other companies. All good research starts with a question to answer. Some examples of good research questions that have been turned into thesis´ include:

- Under what conditions does direct store delivery make sense?
- What is the optimal delivery frequency to replenish stores and how should it be determined?
- When should a firm use dedicated versus for-hire assets?
- How can we improve the demand forecasting of customized fashion items?
- How can a company make plans with uncertainty in both demand and supply?
- How can the product management process be improved to consider supply chain capabilities?
- How can vendor managed inventory (VMI) programs be cost or value justified within the XXX industry?

These are all excellent starting points for a research thesis. On the other hand, here are three examples of less desirable research questions along with recommendations on how they can be transformed into better questions.

Where should I locate my distribution center?

This question is too company specific. Instead, the thesis could answer the question “What factors influence the location selection process?”. In that case, the student could include the company problem as a case study to illustrate the methodology.

What is the closed-form optimal inventory replenishment policy for a multi-echelon, multi-stage assembly network with stochastic demand, randomly distributed lead times, and elastic pricing?

This is a great research question for a PhD student, but not for a Master student. We need to make sure that the question can be explored by a student with master´s level skills in eight months. A modification of this question could be: “What factors impact safety stock placement in a multi-echelon network?” In that case, the student can understand the current situation and, perhaps, simulate the network to understand where the trade-offs might be.

What supply chain strategy is best for my company?

This research question has two problems. First, it is too company-specific. But more importantly, it is overly vague and open-ended. The student can go in a million different directions – none of which might be close to the one you are actually interested in. In this case, the best approach is to narrow the question down to one aspect of supply chain management, for example, performance metrics, and reformulate the question to “How should a performance management system be established within the XXX industry?” In that case, the student can include a company-specific case study as part of the thesis.

Defining a Good Project (cont.)

The second characteristic of successful master thesis´ projects is that the sponsor understands that these are research rather than consulting projects. Granted, the line between the two can be rather fuzzy at times.

Generally, though, a **consulting project** is one that

- Applies a well-known methodology or approach,
- Uses personnel who have performed these types of studies before, and
- Are expected to come up with a specific actionable answer.

A **research project** on the other hand is one that

- Applies a new or non-traditional methodology to the problem at hand,
- Uses personnel who have not solved this problem in this specific way before, and
- Are not sure what they will come up with.

A good example of a project that is more consulting than research is a supply chain network design (SCND) project that aims to locate facilities using cost and demand data. Such projects, while tricky, often follow a very well-defined process and use traditional optimization tools. Hence, they are best solved using packaged software and personnel who have conducted a dozen or so similar studies, resulting in a recommendation like "put DCs in Atlanta, Chicago, and Reno." Research in SCND would instead consider general network strategies, evaluate new optimization approaches, etc. The result could be insights such as "if product is made more modular, then we could use postponement on final assembly and reduce the total safety stock levels in the system", or "the optimization approach should incorporate a broader set of scenarios regarding volatility in exchange rates and commodity prices to make robust global sourcing decisions."

A good example of a project that is more research than consulting is one that was conducted for Reebok in 2004[1]. *The initial question focused on how to better forecast personalized (team and player name) NFL jerseys – a notoriously difficult fashion item to predict. If this was a consulting project, the team would have looked at available demand management software in the market and delivered a ´better´ forecasting engine. The students, along with a faculty advisor, took a different track. They observed that demand for a particular jersey was driven primarily by the success of the sports team. But, they noted, if Reebok could perfectly forecast NFL championships, then perhaps they should get out of the apparel industry and move to Las Vegas. They concluded that highly variable, unpredictable demand was not going away. Rather than focus on the forecasting, they looked at how the supply chain could be more responsive to this uncertainty. After a lot of analysis, they concluded that by postponing the majority of the jersey personalization, they could make the whole process more agile and thus reduce both the shortage of hot demand jerseys as well as reduce the excess of the slow-moving jerseys – which was the real problem after all.*

[1] For more details on this project, see either "When Delaying Decisions is Good" by Anne Field in the June 2005 Supply Chain Strategy Newsletter, Harvard Business Review Press, vol. 1, no. 4, pp. 5-7. Or the original MLOG thesis by John Parsons, "Using A Newsvendor Model for Demand Planning of NFL Replica Jerseys", MIT Thesis, 2004.

Defining a Good Project (cont.)

The major differences between a consulting and research project are:

- Consulting projects look for specific numeric results while research looks to uncover insights,
- Consulting projects result in production ready tools and approaches while research projects develop prototypes that prove concepts, and
- Consulting projects cover all aspects of the problem (e.g. study all 17 DCs in a network), while research projects focus only on portions of the problem that are illustrative (e.g. study one large and one small DC, not all 17).

For research projects the end result is never really known at the start of the project. In fact, the unintended and unforeseen results are some of the main benefits of a research-oriented project. By letting the team explore, they can usually come up with valuable insights that would not have come up under a more standardized consulting engagement.

The third, and most important, aspect of a successful ZLOG project is availability. These projects usually require extensive data, interviews, and site visits. It is critical that the student has timely access to the people and data that are relevant to the analysis. The number one source of failure in these projects is lack of availability of the sponsoring company. If the project relies on the students meeting with resources external to your company (e.g. clients, suppliers, etc.), it is critical that these are lined up and agreed upon before the project starts.

The three characteristics of successful projects therefore are:

- Developing a well-defined problem that has general interest beyond the company,
- Having a researcher rather than consulting focus on the project, and
- Providing access to data and people as required.

Project Scope Definition – template

Project scope needs to be defined at a high-level s that students can understand the objective of the project and understand its boundaries. ZLC will provide with a template where the following fields will need to be provided by the partner company:

PROJECT TITLE	Name of the project that summarizes its scope or objectives
Proposed by	Name and contact information
Key Research Question / Hypothesis	What single over-arching question will this research try to answer?
Team Profile	Number of students and qualifications required
Project Description	A short paragraph on what the project will accomplish – an abstract
Data Type & Sources	Where will the data come from and what will it look like?
Potential Methodology	• Will this project involve modeling (simulation, econometric, optimization, network, system dynamics, …)? • Will this project involve field work? (survey [many observations, structured responses], interview [few observations, semi-structured responses with more depth than a survey], case study [focused observation, unstructured response, open-ended]). • Will this project involve conceptualizing? (Delphi [very few observations panel of experts, undefined], Synthesis [creating a new framework from existing literature]).
Potential Thesis Advisor	MIT-Zaragoza faculty member of preference by the company, if any
Partner Contact	Name and contact information of the main contact person
Partner Communication	What are the expectations throughout the project regarding availability and communication (site visits, phone calls, etc.)
Is	Detailed listing of everything that this project IS going to cover, explore, etc. This is a good place to list critical assumptions and set expectations.
Is Not	Detailed listing of everything that this project IS NOT going to cover, explore, etc. This is a good place to list critical assumptions and focus of the project.

Project Scope Definition – Example 1

PROJECT TITLE	GLOBAL SUPPLY CHAINS – TARIFF AND DUTIES OPTIMIZATION
Key Research Question / Hypothesis	How do you optimize total landed costs for global supply chains including the impacts of tariffs and duties?
Project Description	In the automotive industry (and several other manufacturing industries) production material is sourced globally and vehicles (finished product) are shipped to markets across the globe. However, material sourcing decisions are often made several years ahead of actual production and made individually within product programs due to staggered life cycles. The research in this project will be to develop robust methods and models to evaluate and optimize the enterprise supply chain cost including the impacts due to tariffs and duties across the lifecycle time horizon as well as across the product portfolio.
Data Type & Sources	Data will be provided for a set of example products – number of product variants, content of those variants, supply chain costs such as logistics rate tables, inventory requirements, tariff tables, container and miscellaneous costs. Data sources will be mainly internal from the company (under confidentiality) and data obtained through benchmarking exercises.
Potential Methodology	• Survey and benchmarking of current processes in various global manufacturing industries, • Modeling (simulation, optimization, forecasting) of the process, • Hypotheses of alternate methods/ business process and validation.
Partner Contact	Technical Director, Company X
Is	• Brief overview of current methods used with research/ literature review of company actions and results, • Analysis of specific Supply Chain details to identify/ illustrate opportunities, • Robust structure for performing this type of analysis, • Extrapolation of results to develop actionable “principles”, • Limited to automotive/ manufacturing supply chains (though lessons learned could also include lessons from other industries).
Is Not	• Development of a specific recommendation for a single product/ single company, • Solely a literature review or high-level summary of different industry approaches.

Project Scope Definition – Example 2

PROJECT TITLE	DESIGNING THE HYDROGEN SUPPLY CHAIN
Key Research Question / Hypothesis	How do you design the supply infrastructure for producing hydrogen with renewable sources (e.g. wind) and delivering at the lowest landed cost to the consumer? How should this infrastructure be phased in given various stages of consumer adoption/ demand?
Project Description	Most research on the "hydrogen economy" focuses on production and consumption technologies. Further research needs to evaluate the end-to-end hydrogen supply chain to identify the most effective alternatives for the storage and distribution systems that connect production and consumption given various stages of consumer adoption/ demand. Additionally, a supply chain approach is needed to evaluate the tradeoff between centralized and distributed production. This project extends preliminary work assessing renewable sources of energy to produce hydrogen for automobile consumption in a country. Initially, the existing model will be utilized with refined parameters and analysis of many more scenarios. Further issues related to the utilization of the electric grid will be explored. This work contributes to a larger government-funded research project and involves interaction with Company Y.
Data Type & Sources	US Department of Energy, EU research programs, public data on energy consumption, Company Y.

Potential Methodology	• Extend current optimization model for supply chain network design
	  ○ Refine parameters,
	  ○ Evaluate many more scenarios for demand (population density, consumer behavior) and supply (incorporate available infrastructure such as roads, pipe, electrical grid).
	• GIS based model

Partner Contact	Project manager, Company Y
Is	• Assumes technology evolves such that hydrogen is an economically viable option to powering automobiles, • Analytical modeling including GIS, network optimization, scenario analysis.
Is Not	• Exploration and evaluation of various technologies for production or storage of hydrogen, • Does not create a rollout plan for infrastructure. Future research might investigate the rollout plan utilizing real options methodology.

For more information, please contact:

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