

**ZLC**



**MIT GLOBAL  
SCALE NETWORK**

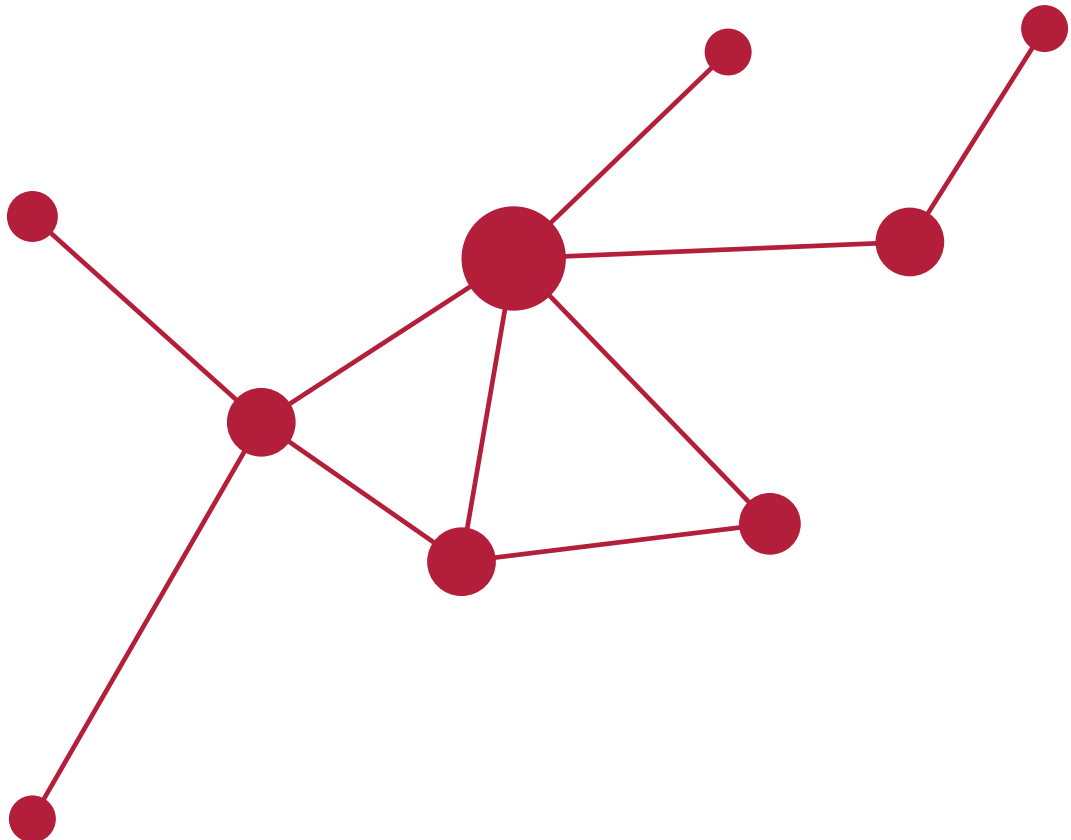
**TALENT HUB FOR SUPPLY CHAIN**

*Zaragoza Logistics Center*

# ZARAGOZA ACADEMIC PARTNERS

*Guide 2019-2020*

## ZLOG



## Index

Background and General Information	Page 3
Process and Timeline	Page 4
Deliverables	Page 5
Defining a Good Project	Page 6
Project Scope Definition	Page 9

## 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. In a unique move to link academia with industry, ZLC is located in the middle of PLAZA, one of the largest logistics parks in the world. 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](http://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 was formalized and established the Zaragoza Academic Partner (ZAP) program. 37 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 a 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 for networking and discussing on 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, and 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 in page 9 of this document and an example on page 10) to summarize the project. This project scope document should be completed by August 2<sup>nd</sup>, 2019.

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 the students. We have set aside Sep 11<sup>th</sup>, 12<sup>th</sup> and 13<sup>th</sup> for company presentations. A visit in early September could also give your company a head start in the recruiting process. In late September the students bid on the projects and then thesis projects and advisors are assigned, with the commitment to companies to assign at least one of their preferred candidates, as long as the project has been ranked in the top 50% by them.

The kickoff meeting to formalize a project plan and define resource requirements should occur 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 student 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 team 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 25<sup>th</sup> 2019 in Zaragoza. All partner companies are welcome.

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 2019-2020 academic year is as follows:

DATE	TOPIC
April-July	Identify project scope
Aug 2	Submit final project scope document
Sep 11, 12, 13	Partner companies present thesis proposals to the ZLOG class (with optional and recommended on site session)
Sept 27	Finalize student-project matching - 2 or 3 students per project
Oct - April	Project work with regularly scheduled meetings
Jan 30	Research Expo in MIT CTL facilities, Massachusetts (date to be confirmed)
May 8	Final Thesis due
May 15	Final Executive Summary due
May 18-22	Final presentation to partner company – date and format to be jointly agreed
May 25	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 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 these 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 make arrangements 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 turned into theses 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 uncertainty in demand be incorporated in my transportation procurement process?
- 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?" Then, 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?" Then the students could 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 could 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, say, performance metrics, and ask the question, "How should a performance management system be established within the XXX industry?" Then, the student could include a company specific case study as part of the thesis.

## Defining a Good Project (cont.)

The second characteristic of successful master theses 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 1) applies a well-known methodology or approach, 2) uses personnel who have performed these types of studies before, and 3) are expected to come up with a specific actionable answer. A research project, on the other hand, is one that 1) applies a new or non-traditional methodology to the problem at hand, 2) uses personnel who have not solved this problem in this specific way before, and 3) 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<sup>1</sup>. 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 tack. 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 came to the conclusion 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 found that by postponing the majority of the jersey personalization, they could make the whole process more agile and thus reduce the shortage of hot demand jerseys and excess supply of the slow moving jerseys – which was the real problem after all.

---

<sup>1</sup> 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 successful ZLOG projects 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 then are,

- Developing a well defined problem that has general interest beyond the company,
- Having a research 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 so 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:

<b>PROJECT TITLE:</b>	<b>Name of the project that summarizes its scope or objectives.</b>
Proposed by	Name and contact info.
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	<ul style="list-style-type: none"> <li>- Will this project involve modeling (simulation, econometric, optimization, network, system dynamics,...)?</li> <li>- 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]).</li> <li>- Will this project involve conceptualizing? (Delphi [very few observations, panel of experts, undefined], Synthesis [creating a new framework from existing literature]).</li> </ul>
Potential Thesis Advisor	MIT-Zaragoza faculty member of preference by the company, if any.
Partner Contact	If a company is involved, who is the primary contact? Name and contact info.
Partner Communication	If a company is involved, 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 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	<p>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.</p> <p>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.</p>
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	<ul style="list-style-type: none"> <li>- Survey and benchmarking of current processes in various global manufacturing industries.</li> <li>- Modeling (simulation, optimization, forecasting) of the process.</li> <li>- Hypotheses of alternate methods/business process and validation.</li> </ul>
Partner Contact	Technical Director, Company X.
Is	<ul style="list-style-type: none"> <li>- Brief review of current methods used with research/literature review of company actions and results.</li> <li>- Analysis of specific Supply Chain details to identify/illustrate opportunities</li> <li>- Robust structure for performing this type of analysis.</li> <li>- Extrapolation of results to develop actionable “principles”.</li> <li>- Limited to automotive/manufacturing supply chains (though lessons learned could also include lessons from other industries).</li> </ul>
Is Not	<ul style="list-style-type: none"> <li>- Development of a specific recommendation for a single product / single company.</li> <li>- Solely a literature review or high level summary of different industry approaches.</li> </ul>

## 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	<p>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.</p> <p>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.</p>
Data Type & Sources	US Department of Energy, EU research programs, public data on energy consumption, Company Y.
Potential Methodology	<ul style="list-style-type: none"> <li>- Extend current optimization model for supply chain network design</li> <li>- Refine parameters.</li> <li>- Evaluate many more scenarios for demand (population density, consumer behavior) and supply (incorporate available infrastructure such as roads, pipe, electrical grid).</li> <li>- GIS based model.</li> </ul>
Partner Contact	Project Manager, Company Y.
Is	<ul style="list-style-type: none"> <li>· Assumes technology evolves such that hydrogen is an economically viable option for powering automobiles.</li> <li>· Analytical modeling including GIS, network optimization, scenario analysis.</li> </ul>
Is Not	<ul style="list-style-type: none"> <li>· Exploration and evaluation of various technologies for production or storage of hydrogen.</li> <li>· Does not create a rollout plan for infrastructure. Future research might investigate the rollout plan utilizing real options methodology.</li> </ul>

**For more information contact:**

Marta Romero, Director, Master of Engineering in Logistics and Supply Chain Management (ZLOG)

MIT-Zaragoza International Logistics Program, Zaragoza Logistics Center ([www.zlc.edu.es/zlog](http://www.zlc.edu.es/zlog))

Email: [mromero@zlc.edu.es](mailto:mromero@zlc.edu.es) Phone: + 34 976 077 605