DeMaMech Exchange Project

REPORT

The University of Tokyo
Sep. 04 – Feb. 05

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東京大学
THE UNIVERSITY OF TOKYO

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2 Executive Summary

September 2004 I left behind family and friends in Denmark and moved to Japan for half a year in order to finish my studies at The University of Tokyo.

Studying Lean Production, the opportunity to go to Japan for half a year to finish my master degree in this field was an outstanding opportunity. Being close to the primary source of Lean Production – Toyota Motor Corporation – was a dream coming true. Therefore, I did not hesitated long before deciding to join the DeMaMech exchange project, which resulted in half a year study at The University of Tokyo.

Based on a case study and benchmarking of Toyota Motor Corporation, the master thesis was carried out on the subject *"Lean Supply Chain Management."*

Toyota has shown worldwide superior performance in terms of effective inter-firm relationships. Consequently, Toyota's approach toward supply chain management was mapped and compared to Danish environment in order to conclude what can be learned from Toyota, i.e. extractions from a case study of Toyota were made and sought put into a Danish context.

Based on the findings of the case study of Toyota and a analysis and comparison to Danish environment, a model for how Danish companies achieve a lean supply chain was developed.

The outcome of the Master Thesis was fulfilled within the 5½ months in Japan under the supervision of Professor Kimura. The result was promising and received very positively by Professor Kimura.

Not only intellectually, but also personally I have learned a lot from my half year in Japan.

Being abroad far away from home, family and friends and in a totally different culture has contributed to a personal evolvement. Because of this experience, I think that I will be even more prepared for the challenging future that is facing me: I have now finished my master degree and am applying for a job. Hopefully, my experience in Japan will help me on my way – or at least distinguish me from the many other applicants for the same job opportunities. If not, I still had a wonderful time I Japan that I will never forget!

3 Travel Schedule

Before going to Japan, all European participants of the DeMaMech Exchange Project were gathered for a two-week workshop at Delft University of Technology in Holland.

The workshop was meant as a preparation for your coming studies in Japan. Two lectures of Japanese language were held every morning to introduce us to the basic of the language. In addition, we were introduced to Japanese economy and culture. We were grouped into four groups according to Host University and were to do a group work with the objective of presenting our host university to the other participants at the final day of the workshop. Finally, since the DeMaMech project is sponsored by the European Union, we additionally had to learn about a EU-country, why there also were presentations on Holland and Dutch history, business, and economy.

The departure to Japan was in mid-September 2004. The flight took approximately 12 hours totally. We arrived in Narita airport early in the morning and managed to transport ourselves to our accommodation by using public transportation.

The next five months were primarily spend at the University of Tokyo in Kimura Lab, were we conducted our Master Thesis. However, we had time off in the weekends, which were spent on travelling and exploring Japan.

We handed in our Master Thesis at February 10, 2005 and had the oral defence examination at February 18, 2005.

At February 28, 2005 a half-year in Japan had come to an end. Our flight back to Denmark were leaving at 10.40 am.

Table 1 below, summarises the travel schedule explained above.

Date	Activity	Place
Aug. 30. – Sep. 10. 2004	Workshop in Delft Preparation for a study life in Japan	Delft, Holland
Sep. 14. 2004	Departure from Denmark	Copenhagen, Denmark
Oct. 2004 – Feb. 2005	Conduction of Master Thesis Kimura Lab, The University of Tokyo	Tokyo, Japan
Feb. 28. 2005	Departure from Japan	Narita, Japan

Table 1 - Travel Schedule

4 Research

In Denmark it is common to conduct the Master Thesis in groups of two students. Therefore, also at The University of Tokyo, we were two students cooperation on our master thesis: Elsemarie Knage-Rasmussen and myself, Birgitte Sten Jørgensen.

We only had five months to finish the master thesis, which is a limited time frame compared to projects carried out in Denmark. Consequently, we choose to do a pre-project in Denmark on our research topic before going to Japan. Based on this pre-project, we gained a broad overview of our research field and identified areas for further research in Japan.

4.1 Lean Supply Chain Management

Studying at the Department for Manufacturing Engineering and Management, our master thesis was related to this research field. More specific, the study area was Lean Production. The title of the master thesis was *"Lean supply Chain Management – A Case Study of Toyota"*.

It says in the guidelines for the conduction of the present report that the research paragraph should be a "Technical Report!". What this precisely means is somewhat unclear. The research field within Manufacturing Engineering & Management some may not perceive as technology, but more as a management strategy. Nevertheless, Lean Production was the topic of our research.

The following summarises the master thesis in terms of background & Motivation, Approach, and Findings & Conclusion.

4.1.1 Background & Motivation

The publishing of *"The Machine That Changed the World"* in 1990 (Womack, Jones & Roos, 1990) marks the worldwide breakthrough of lean production. Since then, there has been a major focus on lean production as a way to enhance competitiveness.

Danish companies too have turned their attention to lean production, which seems to be the definitive answer to make Danish companies more efficient. According to a survey made of the Confederation of Danish Industries (DI) [1] in 2004, lean production is the preferred management concept among manufacturing companies: more than 80% of the Danish companies asked have already or are considering implementing lean production (Palstrøm, 2004).

Studying lean production, the opportunity to go to Japan for half a year to finish our master degree in this field was seen an outstanding opportunity. Being close to the primary source of lean production – Toyota Motor Corporation – was a dream coming

[1] The Confederation of Danish Industries (Dansk Industri - DI) is a private organisation funded, owned and managed entirely by currently 6,100 companies within the manufacturing and service industries. Hence, the power of the organisation is considerable in Denmark.

true. Therefore, we did not hesitated long before deciding to join the DeMaMech exchange project, which resulted in half a year study at The University of Tokyo.

Before our studies in Japan, we conducted a pre-project on lean production during the summer of 2004 in order to get a more in-depth understanding of the approach. The history and development of lean production was examined, as were the benefits, challenges, and limitations of lean production. The primary focus of the pre-project, however, was on analysing the lean principles in perspective to Danish culture, with the overall objective to clarify whether lean production can be adapted to Danish culture.

In addition to the pre-project, we interviewed 10 Danish companies on the subject lean production in Denmark. The purpose of this survey was to gain more in-depth knowledge about lean implementation in Denmark and to verify or disprove our findings of the pre-project. Moreover, this survey served to detect the expansion of lean production in Denmark, and to clarify the future challenges that Danish companies face in perspective to becoming a lean enterprise.

The outcome of the above mentioned studies were the following:

In the pre-project, we state that while the worldwide breakthrough of lean production happened back in the 1990s, the acknowledgement of lean production in Denmark happened relatively late, i.e. in the early 2000s. Although, since then several companies are working with lean production, many Danish companies still have a long time ahead of them in order to gain the full benefits of lean production.

This assessment has been made based on the finding that in order to attain the full benefit of lean production; the whole supply chain needs to be included. Having successfully implemented lean production within the focal company, the lean practices should be developed beyond the mechanism internally in the company. Consequently, to successfully adopting lean production, the whole value stream has to be considered, i.e. the focus should be expanded to also considering up- and downstream relationships.

Still, as the overall focus of lean production is cost reduction, we concluded that any company could benefit from lean production no matter industry. Moreover, we did not identify any larger constrain in terms of Danish culture, why the conclusion was that lean production is adaptable to Danish environment. Though, we saw one major challenge for Danish companies pursuing leanness: a change of mind-set is needed.

The interviews with the ten Danish companies verified the late introduction of lean production in Denmark. The main motivation for introducing lean production was found to be the promising outlook to obtain cost reduction. In general it seemed that the perception of lean production was more analogue to a rationalisation concept than a philosophy. Accordingly, it became clear that Danish companies have not yet expanded their focus of lean production beyond the organisation's internal barriers. Consequently, we find that the future challenge of Danish companies, in regard to becoming a true lean enterprise, is to extend lean production to their supply chain.

So far, the vast majority of the studies of lean production have focused on how to apply lean production internally in the company. This seems reasonable, as this is the first step on the path to achieve leanness. However, while many authors advocate that lean production should be extended beyond the company's internal barriers in order to gain the full benefit of lean production, e.g. Womack & Jones (2003), we have found no suggestions on how this should be done in practise. Consequently, this becomes an interesting field to explore. Especially, considering that the next step for Danish companies will be to expand their focus of lean production in order to create a lean supply chain. The aim of the master thesis, therefore, was to contribute to Danish companies within this field. As a result, the master thesis focused on how to achieve a lean supply chain and how to adapt to Danish environment.

4.1.2 Objectives

Considered the situation in Denmark we found it interesting to investigate lean production in a supply chain context. Thus, the objective of the master thesis was:

To examine how to create a lean supply chain

Toyota has shown superior performance compared to its western competitors. Part of this success is believed to be Toyota's ability to see beyond the company's internal barriers. Consequently, Toyota has been used as a case for studying lean production in a supply chain context. The objective of the case study was:

To examine Toyota's approach toward supply chain management

Having identified Toyota's approach toward supply chain management, it has been compared to Danish environment in order:

To examine how Danish companies can benefit from Toyota's approach, and how to adapt to Danish environment

4.1.3 Approach

Information based on both primary and secondary source has been used for conducting the case study and benchmarking of Toyota.

The primary sources consisted of plant visits and company interviews with Toyota Motor Corporation and one of its main suppliers, Denso Corporation, and founded the basis of the case study. In addition various secondary sources such as article, books, conferences, presentations, etc. have been included when needed.

After finishing of the case study of Toyota, comparisons to Danish environment was made in order to conclude what can be learned from Toyota's approach toward supply chain management, i.e. extractions from the case study of Toyota were made and sought put into a Danish context.

Based on the findings of the case study of Toyota and the analysis and comparison to Danish environment, we developed a model for how Danish companies achieve a lean supply chain.

4.1.4 Findings & Conclusion

In the recognition of the fact that no supply chain is stronger than the weakest part of the chain implies that in order to attain a lean supply chain, every member of the supply chain should to be lean, i.e. the lean principles should be spread and applied internally in every company of the supply chain.

However, looking at Toyota's approach toward supply chain management implies that there is more to a lean supply chain than just spreading the principles of lean production. The way Toyota cooperates with its suppliers is unique and it is perceived as a vital part of its worldwide-recognised performance. Based on a case study of Toyota, four issues have been identified as central for achieving a lean supply chain: Production Planning Method, Outsourcing, Partnerships, and Supplier Association. Consequently, we recommend Danish companies to learn from Toyota's experiences in these areas.

Based on the above findings, a three-step model has been developed, as the conclusion to how Toyota's approach can be adapted to Danish environment and, thus, how Danish companies can create a lean supply chain. The model is illustrated in Figure 4.1, below.

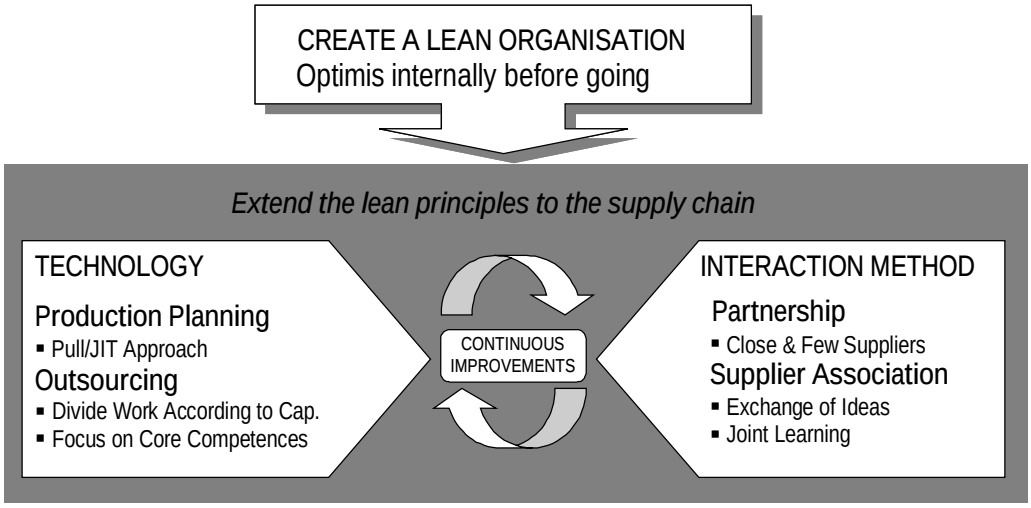

Figure 4.1 - Roadmap for Creating a Lean Supply Chain

We did not identify any larger constrains in terms of adaptability of Toyota's approach to Danish environment, except from one: Danish companies' fear of close relationship. This we find is the one major challenge for Danish companies to overcome, why we argued that a change of mind-set is needed toward perceiving the parties in the supply chain as partners not competitors. This change of mind-set is critical; as we find that, in particular, Toyota's effective inter-firm relationships are the underlying reason for a successful implementation of TPS, i.e. lean production, in the supply chain.

5 Exchange Student Life

Being a student at The University of Tokyo was in many ways similar to being a student at The Technical University of Denmark, but still very different.

5.1 The Life As a Student at The University of Tokyo

We were assigned to Kimura Lab consisting of approximately 14 members totally. Since we did not attend any lectures, the lab made up the physical sphere of our stay at the university. The lab was arranged in a typical Japanese style: open-space office with many people in one room sitting in each their little cube of approximately 1 m^2.

Every Monday the weekly lab meeting was held for all members. This meeting served to provide a status on everybody's research area and progress. Typically, two members of the lab were presenting their research using PowerPoint. After each presentation, there was a question session. Finally, the lab meetings severed as a time for bringing up informal discussions and for sharing information.

We were able to maintain our "Danish style" of studying most of the time. For instance, we insisted on meeting at 8 am, which resulted in us being the ones opening the lab every morning. On an average day, we worked from 8 am until 6 pm, with a study week from Monday to Friday. This meant the hours were somewhat longer than the Danish hours, but considered our limited time frame for conducting the master thesis it was necessary.

The Japanese students thought it was a bit strange, as the "Japanese style" of university study means hours from 10-12 am until 6-8 pm – and a lot of sleeping in between. Sleeping at the lab was something that I found really peculiar, but I got use to the sight, since everybody did it regularly.

The lab we stayed in was not particular social. We were many nationalities and worked on very different research areas, which hindered the social activities somewhat. But still the atmosphere and working environment in the lab was OK. However, I did get the impression that many of our neighbour labs were much more social – and traditional Japanese; meaning more group-oriented. But as said, the half-year in Kimura Lab was still a good experience.

Professor Kimura was a very good a highly skilled supervisor. Although, we did not have as much interaction with Kimura, as with our Danish supervisors when being in Denmark, we still benefited a lot from Kimura and his knowledge. Also thanks to Kimura, we had the opportunity to visit and interview Toyota and Denso, which make up the empirical framework of our research. Without these interviews and plant visits, we would not have been able to reach the same level of conclusion to our master thesis, as we have had.

The International Student Office, the "Repikan" was very helpful, especially in the start-up phase of our stay at the University. Not only with formalities the staff proved its worth, but also for arranging various social study tours it was great. For instance, a

Bus Study Tour was arranged for all international students a few weeks after semester start.

5.2 The Life as A Tourist In Japan

The weekends were spent actively on travelling and exploring Japan. I spent every penny of my saving for travelling – and I do not regret on bit!

Japan is an expensive country to live in - and even more expensive to travel in. However, all the wonderful memories that I got from travelling cannot be measured in money. It was the time when I truly experienced Japan.

Not speaking Japanese, travelling can be somewhat problematic. However, I thought of this more as a challenge than a hurdle. I met many friendly and interesting people when travelling and experienced the many different sides of Japan and Japanese culture.

6 Suggestions to the Project

The half-year in Japan has been an outstanding experience for me, both intellectually and personally. I would not change it for anything in the world! And will always think back at the time I spend in Japan with a smile on my face.

I would, therefore, like to express my greatest thank to professor Tomiyama from Delft University of Technology and Professor Suzuki from The University of Tokyo and all their colleagues for making the DeMaMech Exchange Project a reality.

I have no specific suggestions of improvements of the DeMaMech Exchange project. As far as I am concerned, the project has been very well arranged and executed perfectly. Therefore, the following paragraph serves mores as a means for evaluation than concrete suggestions of improvements. The focus is laid on listing what I found particular positive about the project and the reasons behind.

6.1 Evaluation

There are three things that I would like to point out as particular positive to the realisation of my studies in Japan:

- The Practical Arrangements
- The Financial Support
- The Workshop

6.1.1 The Practical Arrangements

The fact that accommodation was arranged for us when arriving to Japan was a major benefit. It saved us not only for major uncertainty about the practical arrangement of our stay in Japan, but also for a lot of money. I am very grateful for being giving the opportunity to stay at Komaba International Lodge hosted by The University of Tokyo. It was very convenient and a cheap and good place to live: It was not luxurious, but had everything I needed.

6.1.2 The Financial Support

The fact that we were supported by the European Union made my stay in Japan a reality. Without this support, I would not have been able to realise my studies in Japan.

6.1.3 The Workshop

The workshop in Delft, Holland, was very beneficial as preparation to the studies in Japan.

Introduction to Japan

The introduction to Japan, Japanese culture and economy was good. In particular, the informal presentations held by persons with personal experience with Japanese culture were very interesting. Also the presentation of a European company doing business in Japan was very good. Contrary, the quality of the presentation held by the Japanese embassy was pretty poor. The information might have been interesting enough if presented in another way. Still, seen in the light of my later gained experience with Japanese style of presentation, it was very much in line with it. So in a somewhat ironic

way, I guess even the poor presentation held by the Japanese embassy contributed to preparing me for my stay in Japan.

Language Lessons
The Japanese language lessons were great and showed to be very beneficial for the stay in Japan.

Group work
The grouping of students according to university was a good idea, as it founded for evolvement of friendships from the early start. It was very pleasant to have somebody to rely on, which you know from "home", when being in Japan far away from family and friends back home.

The subject for the group work was also good. The fact that we had to do a little research on the host university and city that we were going to live in for 6 or 10 months were a good opportunity the get prepared – and to share already gained knowledge and information among the group members. The final presentation was great fun and a good idea as a means of evaluation, as everybody got to know a little more about Japan.

Learning about Holland
The introduction to Holland as the European country that we had to learn about was OK. I learned some new things about the country that I did not know beforehand.

However, it would have been nice if the company visit to Phillips were not cancelled. This was something that I from home had had great expectations of. Experiencing the Dutch business culture on first hand would have been a great experience.

Social Activities
I think it is on its place to thank both the Professors and the students from Delft University of Technology for their contribution to the social activities.

As said, I think it was a pity that the company visit to Philips was cancelled. But the alternative visit to Delft Blue and afterwards Den Haag was also nice.

I was positively surprised that many of the Delft students stayed with us from abroad in the evenings and the weekend even if they did have the opportunity to spend their last time with own friends and family instead. I felt very welcome in Delft. Thank you!

7 Summary

Studying lean production, the opportunity to go to Japan for half a year to finish my master degree in this field was seen an outstanding opportunity. Being close to the primary source of lean production – Toyota Motor Corporation – was a dream coming true. Therefore, I did not hesitated long before deciding to join the DeMaMech exchange project, which resulted in half a year study at The University of Tokyo.

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However, not only intellectually but also personally I have learned a lot from my half year in Japan. Being abroad far away from home, family and friends and in a totally different culture has contributed to a personal evolvement. And I think that I will be even more prepared for the challenging future that is facing me: I have now finished my master degree and am applying for a job. Hopefully, my experience in Japan will help me on my way – or at least distinguish me from the many other applicants for the same job opportunities. If not, I still had a wonderful time I Japan that I will never forget!