Applying lean philosophy to the redesign of service delivery process
A case study in the telecommunication industry

Author:
Yue ZHU

Academic/Company: Company
Company name: Telespain
Tutor name: Donatella CORTI

Como, June, 28, 2012
Where there is discord, may we bring harmony;
Where there is error, may we bring truth;
Where there is doubt, may we bring faith;
And where there is despair, may we bring hope.

--Margaret Thatcher
--As quoted at On This Day (BBC)
--A quote attributed to St. Francis of Assisi
--mutual encouragement with all of us
# TABLE OF CONTENT

1. **INTRODUCTION**
   1.1 Industry background 1
   1.2 Research objectives 3
   1.3 Research questions 4
   1.4 Research content 4

2. **METHODOLOGY**
   2.1 Selection of methodology 5
   2.2 Selection of research strategy 6
   2.3 Selection of data collection method 8
   2.4 Methodology selection summary 10

3. **LITERATURE REVIEW**
   3.1 Lean manufacturing vs. Lean service 11
   3.2 Lean principles 14
   3.3 Value stream mapping 20
   3.4 Key performance indicators 22
   3.5 Research framework 24

4. **INTRODUCTION TO CASE STUDY**
   4.1 Company introduction 27
   4.2 Business unit introduction 27
   4.3 Service delivery process 29
   4.4 Execution of interview 30
      4.4.1 The interview execution framework 31
      4.4.2 The design of interview 32
      4.4.3 The execution of interview 32
      4.4.4 Interview protocol 33
      4.4.5 Semi-structured interview questionnaire 34

5. **ANALYSIS OF CURRENT SERVICE DELIVERY PROCESS**
   5.1 Archival data analysis 36
      5.1.1 Projects categorization 36
List of Figures

Figure 1 International call volumes and growth rates, 1991-2011 (TeleGeography, 2011) ___________ 1
Figure 2 Global traffic rate of price decline vs. volume growth (TeleGeography, 2011) ___________ 2
Figure 3 Annual traffic growth, 1991-2011 (TeleGeography, 2011) ____________________________ 3
Figure 4 The convergence of service and manufacturing production orientations (Bowen & Youngdahl, 1998) ________________________________________________________________ 13
Figure 5 Latency types in process monitoring (Hackathorn, 2002) ______________________________ 15
Figure 6 Possible interpretation of the complex relationship of different types of waste (Oehmen & Rebentisch, 2010) ____________________________________________________________ 18
Figure 7 Example: A simple value stream map with environmental data ____________________________ 22
Figure 8 Research framework for process improvement (Rohleder & Silver, 1997) ______________ 25
Figure 9 Single piece flow research guidance (Seddon & O’Donovan, 2010) ____________________ 26
Figure 10 ISBU organization chart __________________________________________________________ 28
Figure 11 Standard service delivery process __________________________________________________ 30
Figure 12 A schematic diagram of case interviews ____________________________________________ 31
Figure 13 Human resource in the business unit ________________________________________________ 33
Figure 14 Gender percentage of interviewees ________________________________________________ 34
Figure 15 Percentage of projects based on service types ________________________________________ 37
Figure 16 Average project life cycle _________________________________________________________ 38
Figure 17 Project lead time distribution ______________________________________________________ 39
Figure 18 Project ordering time distribution __________________________________________________ 40
Figure 19 Project provisioning time distribution ______________________________________________ 40
Figure 20 Project incident time distribution __________________________________________________ 41
Figure 21 Project lifecycle distribution ______________________________________________________ 42
Figure 22 Human resource of presales ______________________________________________________ 45
Figure 23 Value stream mapping for presales _________________________________________________ 46
Figure 24 Distribution of presales daily workload ____________________________________________ 47
Figure 25 Human resource of quotation ____________________________________________________ 49
Figure 26 Value stream mapping for quotation ______________________________________________ 50
Figure 27 Time distribution of quotation daily workload ______________________________________ 51
Figure 28 SIGMA processing procedure for BAU ____________________________________________ 52
Figure 29 Value stream mapping for ordering entry ___________________________________________ 53
Figure 30 Human resource of ordering entry _________________________________________________ 54
Figure 31 Distribution of ordering entry daily workload ________________________________________ 55
Figure 32 Percentage of escalations in different cases _________________________________________ 56
Figure 33 Human resource of project management ____________________________________________ 57
Figure 34 Value stream mapping for project management ______________________________________ 58
Figure 35 Distribution of project management daily workload ________________________________ 59
Figure 36 Example: Average order closed time based on regions, week 14, 2012 ________________ 61
Figure 37 Human resource of procurement __________________________________________________ 62
Figure 38 Value stream mapping for procurement _____________________________________________ 63
Figure 39 Distribution of procurement daily workload _________________________________________ 64
Figure 40 Human resource of provisioning __________________________________________________ 65
Figure 41 Value stream mapping for provisioning _____________________________________________ 66
Figure 42 Distribution of Provisioning daily workload __________________________________________ 67
Figure 43 Current process map ____________________________________________________________ 69
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

Figure 44 Confronted problems categorization .......................................................... 70
Figure 45 Current state value stream map ............................................................... 71
Figure 46 Analysis of current VSM ........................................................................ 77
Figure 47 Database concept ..................................................................................... 85
Figure 48 Proposed new matrix organization chart ................................................ 88
Figure 49 The Optimization Focus Matrix ............................................................... 91
Figure 50 Future process map .................................................................................. 92
Figure 51 Future state value stream map ............................................................... 93
Figure 52 General Optimization Focus Matrix ........................................................ 96

List of Tables

Table 1 Comparing practices by methodologies (Creswell, 2003) ................................ 6
Table 2 Examples of waste in service delivery ....................................................... 17
Table 3 Interviewee composition .............................................................................. 33
Table 4 Questionnaire for the interview ............................................................... 35
Table 5 Number of projects based on service types ................................................ 37
Table 6 Average project life cycle ............................................................................ 38
Table 7 Example of project management workload in week 7, 2012 ....................... 59
Table 8 Current VSM KPIs summary ........................................................................ 72
Table 9 Information Systems in the company .......................................................... 84
Table 10 Improvement metric .................................................................................. 94
### List of Acronyms

<table>
<thead>
<tr>
<th>Acronyms</th>
<th>Full Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2P</td>
<td>Application to person</td>
</tr>
<tr>
<td>BTC</td>
<td>Business technical consultant</td>
</tr>
<tr>
<td>CAGR</td>
<td>Compounded annual growth rate</td>
</tr>
<tr>
<td>CAPEX</td>
<td>Capital expenditure</td>
</tr>
<tr>
<td>DWDM</td>
<td>Dense wave division multiplexing</td>
</tr>
<tr>
<td>E2E</td>
<td>End to end</td>
</tr>
<tr>
<td>FdS</td>
<td>Fuera de sistema (Spanish, Out of system)</td>
</tr>
<tr>
<td>HLD</td>
<td>High level design</td>
</tr>
<tr>
<td>IS</td>
<td>Information system</td>
</tr>
<tr>
<td>ISBU</td>
<td>International Services for Corporate Business Unit</td>
</tr>
<tr>
<td>ISP</td>
<td>Internet service providers</td>
</tr>
<tr>
<td>LAN</td>
<td>Local area network</td>
</tr>
<tr>
<td>LLD</td>
<td>Low level design</td>
</tr>
<tr>
<td>MEN</td>
<td>Metro Ethernet network</td>
</tr>
<tr>
<td>MPLS</td>
<td>Multi-protocol label switching</td>
</tr>
<tr>
<td>MRC</td>
<td>Monthly recruitment cost</td>
</tr>
<tr>
<td>NAP</td>
<td>Network access point</td>
</tr>
<tr>
<td>NID</td>
<td>Demarcation units</td>
</tr>
<tr>
<td>NNI</td>
<td>Network to network interconnection</td>
</tr>
<tr>
<td>NRC</td>
<td>Non recruitment cost</td>
</tr>
<tr>
<td>NTU</td>
<td>Network termination units</td>
</tr>
<tr>
<td>OB</td>
<td>Operational business</td>
</tr>
<tr>
<td>OPEX</td>
<td>Operational expenditure</td>
</tr>
<tr>
<td>PoI</td>
<td>Point of interconnection</td>
</tr>
<tr>
<td>PoP</td>
<td>Point of presents</td>
</tr>
<tr>
<td>QoS</td>
<td>Quality of service</td>
</tr>
<tr>
<td>RFB</td>
<td>Ready for billing</td>
</tr>
<tr>
<td>RFS</td>
<td>Ready for service</td>
</tr>
<tr>
<td>SCA</td>
<td>Sustainable competitive advantage</td>
</tr>
<tr>
<td>SLA</td>
<td>Service level agreement</td>
</tr>
<tr>
<td>TIWS</td>
<td>Telespain international wholesale services</td>
</tr>
<tr>
<td>ToIP</td>
<td>Telephony over internet protocol</td>
</tr>
<tr>
<td>VoIP</td>
<td>Voice over internet protocol</td>
</tr>
<tr>
<td>VPN</td>
<td>Virtual private network</td>
</tr>
<tr>
<td>WAN</td>
<td>Wide area network</td>
</tr>
</tbody>
</table>
Acknowledgement

I’m heartily thankful to my tutors, professor Donatella CORTI from POLIMI, and Mr. Philippe CAMPAGNE, Mr. Javier MARTIN-PAYEN from the case company, whose encouragement, guidance and support from the initial to the final stage enabled me to grow great oaks from little acorns. Considering the high complexity and variability of the research case, I have to understand the whole picture from zero, without your precious time spending on me I would have to multiply my effort in order to reach parts of the final target, without your patient explanation and correction the thesis can’t be well structured, without your thoughtful coordination it will be impossible to finish this project.

It’s grateful to have the support from my parents, especially since the beginning of the master program. You are always my backbone regardless what has happened, tolerant me whenever I have bad mood, correct me whatever I do wrong, guide me wherever I get lost in decision making and still love me no matter how stupid the mistakes are that I have ever made.

To my colleagues in the company, Diego, Marta, Paola, Leandro, Miguel, Osvaldo, David, Jesus, Angel, Leticia, Francisco, Vicente and so on, I can’t name all of you but I owe my deepest gratitude. Despite of being occupied with numerous affairs, you accepted my interview, reviewed the result together with me, corrected any possible mistakes and made suggestions that might be useful. Without your cooperation and help it would be impossible for me to fit the puzzle together completely and correctly and be able to marshal them in a convenient environment.

It’s also a pleasure to thank my classmates who made this thesis possible, even though we have been together for only 2 years, but it feels like that we have known each other for a life time, and I’m really grateful to have you in my life.

Coordinators in UPM, POLIMI and KTH also supported me a lot with the documents and procedures. I’d like to thank Susana, Clara and Linda for their great help.

Lastly, I would also like to offer my regards and blessing to all of those who supported me in any respect during the completion of the project.

Sincerely thanks the ones care about me and the ones I care about. May God be with you!

Yue ZHU
6/15/2012
Como / Italy
Abstract

Lean is an umbrella term for a powerful combination of techniques to maximize customer value by minimizing waste and achieving continuous flow through a sustainable culture of continuous improvement. The term “lean” is used in the U.S. for what was originally created as the “Toyota Production System” by the Japanese carmaker. It is so fashionable since it was born that it’s been widely used in the manufacturing industry during the past decades all over the world. No matter in the opinion of insiders or outsiders, this is a magical word stands for discovering and eliminating discreet wastes, reducing resources requirement and time demand for production, making the manufacturing process efficient and cost effective and eventually building the sustainable competitive advantage of the organization.

There’s already a world of books discussing the implementations. But as for the service delivery process, especially within the telecom industry, there’s no qualitative research carried out to check the validation of lean tool yet. Most researchers still remain on the theoretical level, arguing and debating on the applicability. The objective of this research is to fill in this research niche, check the possibility of using lean tool, naming VSM, to study and redesign the service delivery process in a qualitative way. The research question comes to how to apply the tool in a qualitative way and exam the both sides of the coin.

The author investigated on the service delivery process performance in the Business-As-Usual projects and the key performance indicators of the case company business unit to find out any inconsistencies. One of the powerful lean tools - VSM is used step by step, node by node to identify existing discreet wastes. Based on the lean philosophy and literature reviews, potential possible improvements are proposed to eliminate the wastes, afterwards an ideal new VSM is created, with which it is able to dramatically reduce the resources required to seize customer value, satisfy the same amount of customer demand, increase customer satisfaction, make the company focusing on continuous improvement, and in the end move the company to a higher position in the field with stronger competence to win more market share.

This research work is conducted as a single case study under the lean philosophy by collecting and studying qualitative data using various semi-structured interviews and archival data analysis. Six applicable solutions to lead the organization lean is proposed, and based on which, a brand new Optimization Focus Matrix is introduced to have a broader applicability. Possible benefit, difficulties in implementation and potential risks are also presented. The thesis ends with conclusion, answer to the research questions and discussion on the thesis limitation & future research direction.

Keywords: Lean, Service Process, Value, Waste, VSM, Optimization Focus Matrix
1. Introduction

This is the first and most crucial chapter. It not only provides with a general background of the research, but also defines the significance of its existence. It starts with a brief introduction of the industry, and then explains the research objectives and research questions. At the end of this chapter, an outline of the research is given to show the big picture of the research content and help the readers to know how it is structured.

1.1 Industry background

Telecommunication is the way how the information transmits over certain distance. From the smoke signal in the ancient times, to telegraph and radio since the industrial revolution, to the telephone that allows people talk in real time over long distance, to mobile and Wi-Fi people are using nowadays freely without cables, to the satellite that allows people go into middle of nowhere, it is the telecommunication industry that builds the so-called “information superhighway” which dramatically improved the productivity, brought the human being from stone age into modern society and undoubtedly has huge impact on the development of the human society.

Recent decades saw the rapid growth of telecommunication industry. The world’s effective capacity to exchange information through two-way telecom networks grew from 281 petabytes of (optimally compressed, the same below) information in 1986, to 471 petabytes in 1993, to 2.2 exabytes in 2000, and to 65 exabytes in 2007. (Martin Hilbert & Priscila, 2011) This is almost 30 times the equivalent information boomed within 20 years. Given this growth, the worldwide telecom industry’s revenue was estimated to be $3.85 trillion in 2008. (Internet engineering task force, 2010) It is clear that the telecommunications have a significant potential of growth and play an increasingly important role in the world economy.

Figure 1 International call volumes and growth rates, 1991-2011 (TeleGeography, 2011)
On the other hand, few other industries have experienced more wrenching changes over the past 20 years than the international long-distance telecom business. Service providers have weathered market liberalization, the enormous telecom industry market bubble (and its equally extreme aftermath), intense competition, rapid technological innovation, and non-stop price declines. (TeleGeography, 2011) However, despite all the tragic factor, the market still faces a strong growth rate of roughly between 5%-25% annually. See figure 1.

In the meantime, the growth of volume brings with it the decline of the price. High profit resulted in fierce competition; competition brought down the average price, which raised the entry barrier of the industry, and forced the service providers to extend the volumes to grow bigger and bigger. See figure 2.

It is worth mention the so-called Skype-effect. Since 2004, the growth rate of Skype traffic volume is much higher than the traditional carrier traffic volume, and the gap is enlarging itself. The reason behind this is that the free VoIP is much more attracting than expensive traditional voice traffic to the end customers, especially when comes to the long-distance or international calls. This Skype-effect reveals a new booming market niche and it will be quite interesting to study the customer behavior of this portion in the future.
1.2 Research objectives

This research is intended to improve the performance of the case company through modifying the current business process. The management now faces a lot of headaches: extremely low win rate, high possibility of projects overdue and huge amount of escalations, etc. Solutions are expected from outside intelligence and the author is assigned with this task and starts to search for possible ways out. The first thing the author did was having a long talk to the management the moment the author arrived at the company. By communicating with the management, it is found out that in their mind, the main problems are related to lower than expected operators productivity and long lead time. Under that assumption, the first idea came to the mind of management is using much tighter and severer management control system (MCS) to remind the employees finishing the due duty and submitting the deliverables on time. They resolutely believe applying management control system can provide with what they expect. But as learned from the class, a MCS has four components: cultural control, behavior control, personal control and result control. All of them are focusing on shaping the productivity of the employees while treating them like rigid tools. After interviewing some employees, the author gradually felt that the root cause is not the employees but mainly in the process.

One day after meeting with my tutor, Professor Donatella Corti, an idea came up: why not using the philosophy of lean instead of MCS? Compared with the rigid mechanical MCS, apparently lean is more popular, effective and even up-to-date. Most important of all, it focuses on the process instead of the employee itself. But a question comes with it, since lean especially the Value Stream Mapping tool is traditionally for the manufacturing industry, can it also be used to the service industry? Fortunately or unfortunately, after reviewing the literatures the author found a lot talking about the applicability of lean to service delivery process, but all of them
talking only theoretically, not a single article highlighting a complex case like the one on hand. After careful consideration, it was concluded that it is a challenge but still is interesting to try: a research framework can be set up based on the literatures, and Value Stream Mapping was chosen as the qualitative tool to apply lean to the case company.

In the light of the previous remarks, this research is aimed at investigating the current status of end to end service delivery process inside the business unit, analyzing the predefined “waste” and KPIs based on the principle of lean, and proposing some practical implementations to transform the as-is organization into the desired to-be state. This research takes a pioneer position to check if the principle and the tool of lean philosophy can be useful to the end to end service delivery, it will realize its value as long as it can provide with the readers some practice experience of applying lean tool to a specific case, some hints to avoid indiscretion and some inspirations for the future research.

1.3 Research questions

This research work is intended to answer the following research questions:

Can lean philosophy be applied to redesign the service delivery process in telecom industry?
What processes needs to be followed and what kind of benefit can be drawn for the service provider and stakeholders?

The addressed sub-topics include:

- How can VSM be used for the service delivery process in telecom industry?
- What criteria can be used as KPIs to measure the organization performance?
- Using VSM to identify possible solutions to improve the KPIs.
- Are the solutions practical? Can they be generalized for other companies or industries?
- What are the possible drawbacks and risks that should be avoided?

1.4 Research content

The remainder of the research is organized as follows. The introduction of methodology is given in chapter 2, highlighting the choice of research method and the reason behind it. Chapter 3 is the literature review, focusing on applicable models in defining value and waste, and using Value Stream Mapping as the main tool to reform the business process. To get the case study started, an introduction to company information and research frame can be found in chapter 4. The aim of chapter 5 is to present the result of the archival analysis and current VSM, which is the main result of the semi-structured interview carried out by the author. A desired to-be VSM is presented in chapter 6 together with practical solutions and the Optimization Focus Matrix. And finally conclusions are drawn, together with answers to research questions, research limitations and some future developments are discussed in chapter 7.
2. Methodology

This chapter explains the framework of approach used to answer the proposed research questions. One research approach consists of 3 parts from a hierarchy point of view: research methodology, research strategy and data collection method. A detailed analysis of different parts is carried out and rational behind choices are also outlined.

2.1 Selection of methodology

Methodology Introduction

Broadly speaking, there are three major research methodologies: Qualitative, quantitative and a mixed one.

Quantitative research methodology: Investigator uses post-positivist claims for developing knowledge (i.e. cause and effect thinking, reduction to specific variables and hypotheses and questions, use the measurement and observation and the test of theories). (Creswell, 2003)

Qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomenon in terms of the meanings people bring to them. (Denzin & Lincoln, 2000) And in Creswell’s words, a qualitative approach is one in which the inquirer often makes knowledge claims based primarily on constructivist perspectives (i.e. the multiple meanings of individual experiences, meanings socially and historically constructed, with an intent of developing a theory or pattern) or advocacy/participatory perspectives (i.e. political, issue-oriented, collaborative or change oriented) or both. (Creswell, 2003, p. 18)

A researcher who uses mixed methods research is using a research design with philosophical assumptions as well as methods of inquiry.

A comparison of practices by three methodologies is presented in Table 1.

Methodology Selection

Selecting research approach should be based on the categorization of the problems:

Quantitative approach, in which the problem is:

- Identifying factors that influence an outcomes;
- The utility of an intervention;
- Understanding the best predictors of outcomes;
- Testing theory or explanation.
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

<table>
<thead>
<tr>
<th>Quantitative Approach</th>
<th>Qualitative Approach</th>
<th>Mixed Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tests or verifies theories or explanations.</td>
<td>• Positions himself or herself.</td>
<td>• Collects both qualitative and quantitative data.</td>
</tr>
<tr>
<td>• Identifies variables to study.</td>
<td>• Collects participant meaning.</td>
<td>• Develops rationale for mixing.</td>
</tr>
<tr>
<td>• Relates variables to questions.</td>
<td>• Focuses on a single concept or phenomenon.</td>
<td>• Integrates the data at different stages of inquiry.</td>
</tr>
<tr>
<td>• Uses standards of validity and reliability.</td>
<td>• Brings personal values into the study.</td>
<td>• Presents visual pictures of the procedures in the study.</td>
</tr>
<tr>
<td>• Observes and measures information numerically.</td>
<td>• Studies the context or setting of participants.</td>
<td>• Employs the practices of both qualitative and quantitative research.</td>
</tr>
<tr>
<td>• Uses unbiased approaches.</td>
<td>• Validates the accuracy of the findings.</td>
<td></td>
</tr>
<tr>
<td>• Employs statistical procedures.</td>
<td>• Makes interpretations of the data.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Creates an agenda for change or reform.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Collaborates with the participants.</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 Comparing practices by methodologies (Creswell, 2003)

Qualitative approach, in which the problem is:

- Understanding concept or phenomenon;
- Understanding on little research done on its;
- Understanding on problem that important factor is unknown (being new topic);
- Understanding the particular sample or studied group that existing theories do not apply for in natural setting.

Mixed Methods approach, in which use both quantitative and qualitative approach because want both generalization and detailed view of the meaning of phenomenon or concept for individuals.

Apparently, the objective of this research is to apply theory and tools to an industry sector which hasn’t been (fully) studied yet, it matches the last criteria of qualitative methodology.

2.2 Selection of research strategy

Translated into practice, there are several strategies to carry out a qualitative research work, such as narratives, phenomenology, ethnography, grounded theory, case studies etc.

- Ethnographies: in which the researcher studies an intact cultural group in a natural setting over a long period by collecting, primarily and observational data.
- Grounded theory: in which the researcher attempt to derive a general, abstract theory of a process, action, or interaction grounded in the views of participants in a study.
Case study: in which the researcher explores in depth a program, an event, an activity, a process, or one or more individuals. It is commonly used in social sciences and life sciences.

Phenomenological research: in which the researcher identifies the “essence” of human experiences concerning a phenomenon, as described by participants in a study. The researcher “brackets” his or her own experiences in order to understand those of the participants in the study.

Narrative research: in which the researcher studies the lives of individuals and asks one or more individuals to provide stories about their lives. At the end, the narrative combines views of the participant’s life with those of the researcher’s life in a collaborative narrative.

Creswell defines a case study as an exploration of a “bounded system” with over time through detailed, in-depth data collection involving multiple sources of information rich in context. This bounded system is bounded by time and place, and it is the case being studied – a program, an event, an activity, or individuals. (Creswell, 1998, p. p.61) Case studies may be descriptive or explanatory. The latter type is used to explore causation in order to find underlying principles. (Shepard & Greene, 2003) (Yin, 2009)

According to Oxford University professor Flyvbjerg (2011), a case study is an intensive analysis of an individual unit (e.g., a person, group, or event) stressing developmental factors in relation to context. Compared to other research methodologies, case study has a lot of advantages. Rather than using samples and following a rigid protocol (strict set of rules) to examine limited number of variables, case study methods involve an in-depth, longitudinal (over a long period of time) examination of a single instance or event: a case. They provide a systematic way of looking at events, collecting data, analyzing information, and reporting the results. As a result the researcher may gain a sharpened understanding of why the instance happened as it did, and what might become important to look at more extensively in future research. Case studies lend themselves to both generating and testing hypotheses. (Flyvbjerg, 2006) (Flyvbjerg, 2011)

So when should a case study approach be used? According to Yin (2003) a case study design should be considered when:

- The focus of the study is to answer “how” and “why” questions;
- You cannot manipulate the behavior of those involved in the study;
- You want to cover contextual conditions because you believe they are relevant to the phenomenon under study; or
- The boundaries are not clear between the phenomenon and context.

Considering the objectives of the research, there’s no lack of study applying lean to the service industry, but none is done in a qualitative way. Trace it to the cause, perhaps the high flexibility and variance of the service delivery, together with the complexity and large workload of executing the research are main reasons. From the academic point of view, it’s a relatively new and challenging research objective.
The case company, as an international magnate, has all the elements that can be considered as a typical research object: large number of projects in progress; abundant types of services provided; many steps to make up an end to end service delivery; and most important of all, the support from the management. From the reality point of view, it’s a good research object.

Put two sides of the coin together, these elements make up a perfect case study.

2.3 Selection of data collection method

The third major element that belongs to a research methodology is the specific methods of data collection and analysis. It is useful to consider the full range of possibilities for data collection in any study, and to organize these methods by their degree of predetermined nature, their use of closed-ended versus open-ended questioning, and their focus for numeric versus non-numeric data analysis.

Within the framework of qualitative methodology, emerging methods, open-ended questions, interview, observation, document and audiovisual data, text and image analysis are frequently used. All these methods of information collection can be classified into the two categorizes: primary sources and secondary sources.

Primary sources

1. Contact methods, such as casual conversations, informal interviews by talking through mail, telephone or formal face to face interviews. There are advantages and disadvantages of each method:
   - Sometimes some information can be revealed in an informal communication environment, but the amount of information is quite limited and not organized;
   - For the mail and telephone interviews, large amounts of information can be collected at a low cost of time and effort per respondent, but they are not flexible, the researcher has no control over answers and the manner of interviewer’s questioning may affect the answers;
   - Personal interview can be used in any type of questionnaire and can be conducted fairly quickly. The qualitative research interview seeks to describe and the meanings of central themes in the life world of the subjects. The main task in interviewing is to understand the meaning of what the interviewees say. (Kvale, 1996) Even though it may take longer time to execute and more effort to coordinate, but as a major research tool, it can help with understanding the interviewee’s thoughts and behaviors better.

2. Experimental method. It is a data-based research, which comes up with conclusions capable of being verified with observation or experiment. It can be used as a supplement to the result of the interview.
3. Determining sample design. With this method the researchers can draw conclusions about large groups by taking a sample. It’s not suitable in the case company.

4. Experience of the author. Thanks to the previous working experience as a project manager, the author accumulated certain level of experience, which can be used for comparison.

5. Observation of the author. It is the gathering of primary data by investigator’s own direct observation of relevant people, actions and situations without asking from the respondent. Observation can yield information that people are normally unwilling or unable to provide, for instance, the words and deeds of people can reveal the real company culture which is difficult or unable to summarize. Usually it’s not what the leader of a company say, but what he / she does affects the people around him / her. The limitation is the feelings, beliefs and attitudes observed could be something personal and quite subjective, therefore have negative affect on the conclusion.

6. Survey. This approach is most suited for gathering descriptive information. It’s cheap and quick, but it can’t provide with instant response due to the reluctance of the respondent, further more as in a busy organization like the case company, people may don’t want to spend time on an unknown survey which conducted by an outsider, or just give pleasant answers. Anyways, the accuracy and completeness of the information collected is under suspicion.

Secondary sources

1. Archival data. Historical data is a very good resource to analyze the performance of the company. It can also be used to double check the result of interview.

2. Files, manuals, documents and reports. Black in white documents are important resources to trace the origin of certain process.

3. Intranet, information system (such as e-Room in the case company) and database. Information about the company can be found on the intranet of the company, which provides with massive up-to-date data.

4. Analyst reports on internet. Some reports are also quoted by the author from internet which highlight the general trend of the industry or analyze the competitors’ movements.

Basically the author used all the possible means to collect as much information as possible in order to draw a fair and correct conclusion. Among all these methods, semi-structured interview is used as the primary research source.

Semi-structured interview, especially semi-formal semi-structured open-ended interviews are important research methods used in the social sciences. This kind of interview is designed to be able to get as much as positive feedback from the interviewees, is the major method used in the research to collect data by the author. While a structured interview has formalized, limited set questions, a semi-structured interview is flexible, allowing new questions to be brought up during the interview as a result of what the interviewee says. The interviewer in a semi-structured interview generally has a framework of themes to be explored.
However, the specific topic(s) that the interviewer wants to explore during the interview should usually be thought about well in advance (especially during interviews for research projects). It is generally beneficial for interviewers to have an interview guide prepared, which is an informal "grouping of topics and questions that the interviewer can ask in different ways for different participants". (Lindlof & Taylor, 2002) Interview guides help researchers to focus an interview on the topics at hand without constraining them to a particular format. This freedom can help interviewers to tailor their questions to the interview context/situation, and to the people they are interviewing.

2.4 Methodology selection summary

In summary, given overall consideration to the academic purpose and the case company reality, after careful analysis and comparison, as the best approach to reach the research objective, in this research it is decided to use the qualitative research methodology, case study strategy with mixed data collection methods: interview as primary source and archival data analysis as secondary source.
3. Literature review

In determining the lean application within the service delivery, it behooves any researcher to have a categorical system and definitive methodology for developing sound investigations and valid conclusions. A substantial literature review can provide good background information, as well as popular and historical perspectives for reference, therefore is essential and fundamental for the coming works. Here explains the concept of lean together with its principles and tools.

3.1 Lean manufacturing vs. Lean service

The concept of lean manufacturing is invented by the Japanese carmaker Toyota decades ago in producing vehicles. In Dr. James Womack’s words (1994), lean is to use the least possible amount of material, time, space, facilities, capital, energy and effort to deliver your product or service to your customer. Anything more is waste. Mistakes, overproducing inventory, excess employees doing incorrect work, more equipment, and incomplete information is waste, people working improperly is the most wasteful – because it damages morale. (Sayer & Williams, 2007) It’s a popular word recently to indicate continuous improvement and respect for people within the organization to develop the organizational sustainable competitive advantage (SCA), which includes the following key benefits:

- Remove waste and duplication;
- Focus on standard and simple processes to meet clients’ needs;
- Concentrate on improving productivity, speed of meeting customer needs and quality of service;
- Motivate and involve staff by encouraging them to take ownership for improvement.

Lean service is another application of this concept in the service delivery industry. In 1972, Levitt wrote a seminal Harvard Business Review (HBR) article entitled “Production-line approach to service”. In it, he argued that the rigor of the production line should be applied to the design and management of services. He used the example of McDonald’s, the fast-food chain, to show how factory methods could profitably be employed to deliver a service. McDonald’s achieved market domination through mastery of a system which is engineered and executed according to a tight technological discipline that ensures fast, clean, reliable service in an atmosphere that gives the modestly paid employees a sense of pride and dignity. Service organizations were thus encouraged to employ the manufacturing approaches of industrialization through standardization. (Seddon & O’Donovan, 2010)

Similarities

The key word of both terms is “process”. The lean approach is an idealizing improvement approach that has an enormous impact in the field of operations management. (Pool, Wijngaard, & Van der Zee, 2011) At first glance, it looks like the service industry is quite different from the
manufacturing industry, but if considered from another point of view, the whole process can be decomposed into steps of information collection, information transformation, and finally information send out to the next station.

Lean includes all the activities that provide value to the customer along a value stream. Think about consumption not as an isolated moment of decision about purchasing a specific product, but as a continuing process linking many goods and services to solve consumer problems. (Womack & Jones, 2005) Due to the different characteristics that the service operations don’t produce any physical hardware that can be stored but usually have the similar certain routines and procedures as the producing process, the principle of lean can be applied in order to improve the quality and efficiency. But unluckily, in terms of operations and improvement, the service industries in general are a long way behind the manufacturing industry. (Hanna, 2007)

The central premise of our defense of the production-line approach to service is that becoming “service-driven” does not require abandoning “service industrialization”. Indeed, the transfer of lean manufacturing technology to service, exemplified by Taco Bell, SWA, and Shouldice Hospital represents transfer of advanced, rather than outdated, manufacturing technology. Just as lean manufacturing has reduced non-value added from production processes while increasing product variety and customer focus, so too has the lean production-line approach to services. (Bowen & Youngdahl, 1998)

**Differences**

The differences between the service delivery process and the manufacturing process mainly consist of two parts: one key concept and three difficulties. The change is from physical product to information, the main difficulties lie in the complexity, flexibility and time-uncontrollability of information.

And more specifically, Seddon et al (2010) reveal the main differences:

- Services are more or less intangible;
- Services are activities or a series of activities rather than things;
- Services are, at least to some extent, produced and consumed simultaneously;
- The customer participates in the production process at least to some extent.

Besides, the stations in the service delivery is not that clear and easily be isolated compare to the manufacturing process, usually there are different processes running parallel, therefore the dependencies can vary from time to time. It usually is not a single chain of steps, but a combination of numbers of participates who entre & leave the process at different stage of time. It is one of the major difficulties the author needs to overcome when applies the VSM to analyze the service delivery process.
Figure 4 The convergence of service and manufacturing production orientations (Bowen & Youngdahl, 1998)

Comparison

Critics of Lean Service have suggested that problems arise when companies try to apply Lean to areas where creativity, ability to react to rapid external changes, need to spend an extensive amount of time to convince external parties (typically lobbying) or ability to successfully negotiate are needed; and that the downsides of Lean are reduced or eliminated creativity and ability to cope with the unexpected.
Proponents of Lean Service, however, suggest that these criticisms are a response to Lean implementations that have failed to properly understand Lean as a holistic, action based management and implementation system to provide enhanced customer value, a "Tools" mentality instead of an outcomes orientation and an inadequate knowledge of how to utilize and adapt Lean Manufacturing methods to the service environment.

For instance, Total Quality Management (TQM) as one application of lean can also be applied to the service industry. The major benefit is “localization” of quality, which means at each stage of processing the local “cell” has the responsibility to ensure that the work that leaves the cell is correct and without defect. To ensure this, a performance time of each node based on the overall time demanded by the customer has to be assigned to the employee, so the employee can check the status of the task at the end of each cycle to see whether the goal has been achieved or not. If yes, the process can continue and the task can be handed over to the next stage; if not, necessary corrections will be taken into account. It can be stopping the line in a manufacturing system, but such as in the case of healthcare (Diane, 2005) the equivalent is to flag a risk issue and resolve it.

In the case of health care (Diane, 2005), although it differs in many ways from manufacturing, there are also surprising similarities: Whether building a car or providing health care for a patient, workers must rely on multiple, complex processes to accomplish their tasks and provide value to the customer or patient. Waste — of money, time, supplies, or good will — decreases value. Examples in this paper of lean thinking in health care demonstrate that, when applied rigorously and throughout an entire organization, lean principles can have a positive impact on productivity, cost, quality, and timely delivery of services.

3.2 Lean principles

In “Lean Thinking”, Womack (2003) declares that lean is underpinned by five principles:

- **Specify value.** Value can be defined only by the ultimate customer. Value is distorted by pre-existing organizations, especially engineers and experts. They add complexity of no interest to the customer.
- **Identify the Value Stream.** The Value Stream is all the actions needed to bring a product to the customer. If the melter, forger, machiner, and assembler never talk, duplicate steps will exist.
- **Flow.** Flow is counterintuitive. Make the value-creating steps flow. Eliminate departments that execute a single-task process on large batches.
- **Pull.** Pull is “take one, make one”. Let the customer pull the product from you.
- **Pursue perfection.** There is no end to the process of reducing time, space, cost and mistakes.

Hicks (2007) summarized later that fundamental to the successful application of lean is the identification of value, understanding of flow and characterization of waste. So from that point of view, there are three key principles of lean:
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

- The identification of value.
- The elimination of waste.
- The generation of flow (of value to the customer).

In Melton’s words (2005), these principles clearly demonstrate that “this was not a philosophy or technique which was only applicable to the automotive industry.”

**Value**

Everything begins and ends with what the customer requires. The customer is the only arbiter of value. Value is created by a process. Waste diminishes value, and a perfect process should maximize customer value, meaning no waste.

What’s the value to customer? The customer really does not want to speak to a person with a title, they want to speak to anyone who can resolve their immediate problem, concern or question. That is who is in charge. (Champy, 1996) Remembering what (you) are “for”, or “there” for, is to “reconnect” with your purpose, your reason for being. Effective reengineering (or process redesign or systems thinking), begins with “reconnecting” with “purpose”.

The fundamental question is, “Why does this process exist, and for whom?” or as Champy (1996) asks: “Why are we doing what we are doing?” (Chamberlin, 2010) "... Selecting processes for reengineering that are in line with the organization’s strategic goals is far more likely to deliver the service improvements and waste reduction that is required." (Chamberlin, 2010)

---

**Figure 5 Latency types in process monitoring (Hackathorn, 2002)**
Figure 5 shows the potential loss of business value caused by a delayed reaction to a business-relevant event. If a decision-maker can react to a process disruption or disturbance in a timely fashion, it may be possible to mitigate the effects of the disturbance before it impacts the process customer. For instance, if it is apparent that a customer’s luggage was not transferred to a connecting flight, an airline representative could greet the arriving customer at the gate and explain the situation, thus avoiding wait time and potential aggravation for the customer in the baggage claim area. If information about the misrouted luggage is reported too late the customer will have waited in vain for his luggage and the resulting impression of the airline’s service may result in a permanent loss of customer loyalty. (zurMuehlen & Shapiro, 2009)

Value demand and Failure demand

In services, there are two high level types of demand, value demand and failure demand. One of the central concepts that distinguish lean services from lean manufacturing is the distinction between Value Demand and Failure Demand. (Seddon J., 2003)

Value Demand is the demand for service from customers, is the reason that the company is in business is to serve these demands, while Failure Demand is the demand caused by a failure to do something right for the customer. When customer demands are not met, for instance, project doesn’t end within budget or timeframe, or end up with not sufficient quality, customer keeps on call back, turn up again until gets a satisfied result, which creates more demand and therefore more work to be done. So doing the things right at the very first plays an important role in improving service delivery and reducing repeated efforts & costs. In Deming’s language, failure demand is a form of sub-optimization. In Ohno’s language it is a type of waste. (Seddon & O’Donovan, Rethinking Lean Service, 2010)

Failure demand can also be defined as "the delivery or production of products and services downstream as a result of defects in the system upstream."(Shillingburg, 2011) This would include administrative rework, audits, inspections and enquires. This non value-added work can account for the majority of administrative work performed.

By treating failure and value demand alike in statistical analysis, failure demand can give the quite false impression of greater productivity. This merely reinforces the need to look at what is really going on, and ask why the service is being rendered.

The service wastes

Lean thinking begins with driving out waste so that all work adds value and serves the customer’s needs. Identifying value-added and non-value-added steps in every process is the beginning of the journey toward lean operations. (Diane, 2005) Many processes around … are poorly organized, resulting in rework, unbalanced workload, and other forms of waste that harm both productivity and morale. The transformation to lean requires companies to identify and
measure the main sources of waste and define opportunities to reduce it. (Kindler, Krishnakantan, & Tinaikar, 2007)

In the Toyota Production System (TPS), Ohno (1998) defined there are seven wastes in the process of producing vehicles which should be got rid of. They are:

- Waste of overproduction;
- Waste of time on hand;
- Waste of transportation;
- Waste of processing itself;
- Waste of stock at hand;
- Waste of movement; and
- Waste of making defective products.

Indeed, knowledge work includes many routine activities that don’t involve judgment or expertise and can eat up huge amounts of time: printing documents, requesting information needed to make a decision, and setting up meetings, to name just a few. (Staats & Upton, 2011)

Examples of typical wastes in service delivery process are listed below:

<table>
<thead>
<tr>
<th>Type</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overproduction/overprocessing</td>
<td>• Fulfillment of requests that won’t be used within next 3 months</td>
</tr>
<tr>
<td></td>
<td>• Unnecessary functionality</td>
</tr>
<tr>
<td>Rework</td>
<td>• Changes in business requirements during development</td>
</tr>
<tr>
<td></td>
<td>• Application bugs</td>
</tr>
<tr>
<td>Wasted motion</td>
<td>• Requests not tied to business priorities</td>
</tr>
<tr>
<td></td>
<td>• Ineffective prioritization of maintenance requests</td>
</tr>
<tr>
<td></td>
<td>• Unplanned task switching</td>
</tr>
<tr>
<td>Wasted intellect</td>
<td>• Limited cross-training of developers across different applications</td>
</tr>
<tr>
<td></td>
<td>• Poor usage of employees and offshoring resources</td>
</tr>
<tr>
<td>Wasted time</td>
<td>• Key resources not available</td>
</tr>
<tr>
<td></td>
<td>• Developers idling because of incomplete information on the request</td>
</tr>
<tr>
<td>Inventory waste</td>
<td>• Maintenance backlogs</td>
</tr>
<tr>
<td></td>
<td>• Many partially completed requests</td>
</tr>
</tbody>
</table>

Table 2 Examples of waste in service delivery

Based on the actual situation of each application, it’s necessary to redefine the wastes. One redefinition of these wastes for service operations by Bicheno et al (2009) is as follows:

- Delay on the part of customers waiting for service, for delivery, in queues, for response, not arriving as promised. The customer’s time may seem free to the provider, but when she takes custom elsewhere the pain begins.
- Duplication. Having to re-enter data, repeat details on forms, copy information across, answer queries from several sources within the same organization.
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

- Unnecessary movement. Queuing several times, lack of one-stop, poor ergonomics in the service encounter.
- Unclear communication, the wastes of seeking clarification, confusion over product or service use, wasting time finding a location that may result in misuse or duplication.
- Incorrect inventory. Being out-of-stock, unable to get exactly what was required, substitute products or services.
- An opportunity lost to retain or win customers, a failure to establish rapport, ignoring customers, unfriendliness, and rudeness.
- Errors in the service transaction, product defects in the product-service bundle, lost or damaged goods.

Yet, on basis of that, another redefinition of seven wastes is closer to this research. It’s done for information work organizations by MIT Professor J. Oehmen et al (2010):

- Overproduction of information.
- Stockpiling of information.
- Generating defective information.
- Correcting information.
- Unnecessary movement of people.
- Miscommunication of information.
- Over-processing of information.

And apparently, all the wastes have possibility of interacting with each other, which results in further loss in resources (time, cost, etc.) of the organization: waiting for people. It can be considered as the butterfly effect of interaction of all seven wastes, and be named as the eighth waste. Once two wastes exist, the relationship between them can upgrade the effect.

![Figure 6 Possible interpretation of the complex relationship of different types of waste (Oehmen & Rebentisch, 2010)](image-url)
Based on the research result of MIT Professor J. Oehmen et al (2010), a possible interpretation of this system of interdependent wastes and their resulting dynamics is:

- The different types of waste form a complex causal network.
- This causal network is highly linked and contains only positive feedback loops. That means that regardless where and what type of waste occurs first, it will quickly trigger a cascade of other types of waste.
- The positive feedback loops will drive the system towards ever increasing instability; the greater the instability, the faster the deterioration.
- The system is thus inherently unstable. It must be actively balanced by negative feedback loops. These consist in proactive practices to minimize the occurrence of waste, as well as quickly reacting to the occurrence of waste. They must also actively avoid reinforcing feedback loops that actually include waste countermeasures, such as the “firefighting virus”.
- Two fundamental root causes are overproduction and miscommunication of information. Waiting of people can be interpreted as the corresponding end point of the dynamics. This can also be read as suboptimal processes, causing overproduction and miscommunication of information, leading, over several steps, to quality deterioration of the information, cost increase due to additionally required effort, and ultimately to schedule slippage due to a high amount of waiting times. This reinforces the importance of high quality processes that avoid overproduction and miscommunication of information.
- This interpretation is supported by the example data claiming that about 2/3 of the time is spend waiting.

**Flow & Pull**

Flow is the progressive achievement of tasks along the value stream so that a product proceeds from design to launch, order to delivery, and raw materials into the hands of the customer with no stoppages, scrap, or backflows.

Pull refers to a system of cascading production and delivery instructions from downstream to upstream activities in which nothing is produced by the upstream supplier until the downstream customer signals a need; the opposite of push.is especially important in service industry, because by design it only provides what the developing learner requires (in terms of “competence” and “confidence”), and it provides it at the time, and at the place, when and where they need it – in other words, at the “place of transaction”… There’s no facility for inventory – services can’t be “stored”, they are consumed at the moment of transaction. Equally there’s mostly no advance notice of this demand until the customer presents their requirement(s), the nature of their demand can’t be known. (Chamberlin, 2010) Therefore, it’s totally in line with Seddon’s requirement (Seddon J., 2008) for “stuff at the point of contact to “pull” expertise from others in the organization to help them out.” Those “others” may or may not be the leader/manager, but either way, it’s the leader’s or manager’s responsibility to make sure that it happens. (Chamberlin, 2010)
Once wasteful actions along the value stream are eliminated to the maximum extent possible at a given time, the next Lean principle is put into practice: making the remaining value-creating steps “flow”. Here the primary challenge is to discard the “batch-and-queue” mentality prevalent in mass production and implement small-lot production, with batch sizes of a single unit as the ultimate goal. Flow is best achieved by discarding traditional functional organizational structures, to be replaced with integrated product/process teams organized along the value stream. It is important to note that the concept of “flow” and small batch size applies not only on the factory floor but throughout the organization (e.g., the flow associated with administrative procedures). (Bozdogan, 2000)

Pull refers to customers pulling value from the value stream (rather than the Enterprise pushing onto customers) results in subsequent pulling actions that cascade up the value chain, stage by stage, through the Enterprise and all the way to the supply chain.

To understand flow and pull, it is necessary to understand the concept of the value stream—that linkage of events or activities which ultimately delivers value to a customer. A value stream crosses functional and, usually, organizational boundaries. (Melton T., 2005)

3.3 Value stream mapping

Value stream mapping is a major lean manufacturing technique as part of Six Sigma methodologies that used to analyze and design the flow of materials and information required to bring a product or service to a consumer. At Toyota, where the technique originated, it is known as "material and information flow mapping". (Rother & Shook, 1999) The main purpose is to deepen the understanding of a value stream by drawing a map of it with qualitative data. In current-state mapping this is done while observing the actual value stream in situation.

Definition

Value stream is the process including a series of steps that transform inputs to outputs; it’s the progress of adding value. The inputs can be materials, methods, information, people, equipment and the work environment. The outputs can be either physical products or services.

During the whole value stream, not all the steps add value, or they can be rearranged in another way to shorten the delivery window time while adding the same value to the final result. So the function of VSM is not only to exam the activities which have major impact on the performance, or to identify where data can be collected and analyzed, it helps to examine the actual process compared to an ideal process, and can also show unexpected complexity, where problem, redundancy and unnecessary loops exist.

The importance of value stream mapping lies in understanding the underlying process is the key to improve the performance. Without knowing the current status of the value stream of the
organization, all the optimization and modifications are done in a small scale and without the correct guidelines in the big picture.

Applications

Value stream mapping is often used to analyze and design flows at the system level (across multiple processes), although often associated with manufacturing, it is also used in logistics, supply chain, service related industries, healthcare (Graban, 2008), software development, and product development.

The effective and efficient management of service processes is the challenge we have before us. We take effectiveness to mean the extent to which a process adapts to customer requirements, resulting in their satisfaction. Efficiency, meanwhile, is how the process converts resources to produce the output customers’ expect; in other words, how the resources used in becoming effective are consumed. (Escobar & Revilla, 2005)

In a build-to-the-standard form, Shigeo Shingo (1985) suggests that the value-adding steps be drawn across the center of the map and the non-value-adding steps be represented in vertical lines at right angles to the value stream. Thus the activities become easily separated into the value stream which is the focus of one type of attention and the “waste” steps another type. He calls the value stream the process and the non-value streams the operations. The thinking here is that the non-value-adding steps are often preparatory or tidying up to the value-adding step and are closely associated with the person or machine/workstation that executes that value-adding step. Therefore each vertical line is the “story” of a person or workstation whilst the horizontal line represents the “story” of the product being created.

Implementation

Rother (2009) defined five steps in “Toyota Kata” to implement the VSM.

- Step 1: Identify the target product, product family, or service;
- Step 2: Draw while on the shop floor a current state value stream map, which shows the current steps, delays, and information flows required to deliver the target product or service. This may be a production flow (raw materials to consumer) or a design flow (concept to launch). There are 'standard' symbols for representing supply chain entities;
- Step 3: Assess the current state value stream map in terms of creating flow by eliminating waste;
- Step 4: Draw a future state value stream map;
- Step 5: Work towards the future state condition.

An example is given as Figure 7 (usually much more complicated in reality). With deep investigating into the current state of the whole value stream, it's possible to calculate the exact value-adding time (VA) and non-value-adding time (NVA), it's the first step for the system
modification, based on which and the lean principle, the future ideal value stream can be drawn together with alternative solutions, such as parallel stations, rearrange of the flow, etc.

Figure 7 Example: A simple value stream map with environmental data

3.4 Key performance indicators

A key performance indicator (KPI) is an industry jargon for a type of performance measurement. (Fitz-Gibbon, 1990) KPIs are commonly used by an organization to evaluate its success or the success of a particular activity in which it is engaged. Sometimes success is defined in terms of making progress toward strategic goals (Reh, 2012), but often, success is simply the repeated achievement of some level of operational goal (for example, zero defects, 10/10 customer satisfaction, etc.). Accordingly, choosing the right KPIs is reliant upon having a good understanding of what is important to the organization. “What is important” often depends on the department measuring the performance - the KPIs useful to finance will be quite different than the KPIs assigned to sales, for example.

KPIs are ways to periodically assess the performances of organizations, business units, and their division, departments and employees. Accordingly, KPIs are most commonly defined in a way that is understandable, meaningful, and measurable. They are rarely defined in such a way such that their fulfillment would be hampered by factors seen as non-controllable by the organizations or individuals responsible. To be more specific, a KPI can and should follow the SMART criteria. This means the measure has a Specific purpose for the business, it is Measurable to really get a value of the KPI, the defined norms have to be Achievable, the improvement of a KPI has to be Relevant to the success of the organization, and finally it must
be Time phased, i.e. the value or outcomes are shown for a predefined and relevant period.

KPIs define a set of values used to measure against. These raw sets of values, which are fed to systems in charge of summarizing the information, are called indicators. Indicators identifiable as possible candidates for KPIs can be summarized into the following sub-categories:

- Quantitative indicators which can be presented as a number.
- Practical indicators that interface with existing company processes.
- Directional indicators specifying whether an organization is getting better or not.
- Actionable indicators are sufficiently in an organization's control to effect change.
- Financial indicators used in performance measurement and when looking at an operating index.

KPIs, in practical terms and for strategic development, are objectives to be targeted that will add the most value to the business. These are also referred to as key success indicators.

**Identification**

Performance indicators differ from business drivers and aims (or goals). A school might consider the failure rate of its students as a key performance indicator which might help the school understand its position in the educational community, whereas a business might consider the percentage of income from returning customers as a potential KPI.

The key stages in identifying KPIs are:

- Have a pre-defined business process (BP).
- Have requirements for the BPs.
- Have a quantitative/qualitative measurement of the results and comparison with goals.
- Investigate variances and tweaking processes or resources to achieve short-term goals.

As discussed with the management and according to the experience with project management, the KPIs for this research can be selected among the following terms:

1. Total process time for a single project/line/customer, TPT;
2. Process time of each step (each nod in the value stream map), PTₙ (n=1, 2…);
3. The probability of escalation, Pₑ (0 ≤ Pₑ ≤ 1);
4. The lead time for each step to be carried on;
5. The percentage of value-adding time (the process time divided by lead time);
6. The availability of SLA compliance;
7. The percentage of time spent on pushing of others, Pₚ (0 ≤ Pₚ ≤ 1); and so on.

In the following parts of the research, certain KPIs will be selected and measured by the author based on the reality of the organization and the research scope. Measurements are placed to check how “lean” it is, then with the help of lean tool to see how “lean” can it be.
3.5 Research framework

Rohleder (1997) suggested a schematic of research framework for the process improvement based on lean philosophy. In his framework,

- The starting point in any organization is a commitment from senior management to ensure appropriate organizational support for process improvement (block 1).
- The next step is to select which process or processes to investigate for improvements (block 2), again a step that should involve senior management, at least through an approval mechanism.
- Once a process is chosen, an appropriate process improvement team must be formed (block 3).
- Their first priority is to carefully define and understand the process (block 4), specifically spelling out appropriate measures of process performance (with approximate target values) and detailing (in schematic form) the steps or activities involved in the process.
- The next phase, streamlining (block 5), involves the removal of obvious wastes, aspects of the process that add no value from the perspective of the customers.
- The subsequent step depends upon whether or not relevant data already exist (block 6), relevant in the sense that they relate to the selected measures of process performance and are in a form that is conducive to identifying specific problems (block 7). If not, the team should begin monitoring the process (block 8), i.e. collecting data at appropriate points along the process.
- "Is process stable?" (block 9) essentially involves the use of statistical control charts. If the process is not stable, as signaled by outliers on control charts, then there are associated problems that must be resolved (block 10).
- As more and more of these problems are resolved, eventually all of the measures of the process will stabilize. At this point the key question (block 11) should be whether or not the process is meeting its targets in terms of the overall measures defined earlier. If the answer is yes, then the team should continue to monitor the process, but the organization can begin to direct attention to a different process (feedback to block 2). If not, a fundamental change is required, i.e. some form of process innovation (block 12).
- Senior management involvement and approval is again necessary for such a major undertaking. Finally, the implementation of the changes associated with problem resolutions and process innovations must be very carefully planned (block 13).
- A dashed line is shown from block 4 to block 12 because some individuals feel that once the process is understood and if the needed improvements are extremely large, then one should jump immediately to innovation (reengineering). It is our view that this is a dangerous, high-risk, shortcut; often rapid, major improvements can be achieved in an inexpensive fashion by carefully proceeding through all of the intermediate steps of the framework.
Figure 8 Research framework for process improvement (Rohleder & Silver, 1997)
Within the scope of this research, the author focuses on blocks 1 to 12, while the last step of implementation will not be within the research scope due to time limitation. Within the framework, the most important part is blocks 4 & 5, which are the basis for the current value stream mapping. Regarding this, it is possible to follow Deming and Ohno: the better way to design and manage service organizations is to understand and manage the organization as a system. The systems archetype below describes a design for managing transactional services in such a way as to see and remove waste continuously. (Seddon & O'Donovan, 2010) It sets the theoretical guidance for how to analyze the current VSM: start with each node in the service delivery process. From the first small beginnings one can see how things will develop.

*HFPVD = High Frequency Predictable Value Demand

Figure 9 Single piece flow research guidance (Seddon & O'Donovan, 2010)
4. Introduction to case study

This chapter introduces the background of the company and the preparation of the research execution. It’s the start part to make the case study running.

4.1 Company introduction

Telespain is an international company in telecommunication industry headquartered in Madrid (Spain). It offers full portfolio of telecommunication solutions, including IP interconnection, capacity, satellite services, corporate services, extended corporate services, VPNs, voice services and mobility services in more than 25 countries.

At the end of September 2011, the whole corporation reached 300 million accesses, which not only sets the good basis for the future growth of the company, but also ranked the company top international integrated telecommunication operator by customer base. By region, Telespain Latin America and Europe, with a year-on-year growth of 9% and 5% respectively, were the major contributors to Telespain's customer base growth. In detail, Latin America is the traditional market due to historical reasons while the Europe market offers significant potential growth. In the meantime, the company is also looking for opportunities in the emerging Asian market, with the strategic alliance with China Unicom, with a PoP (point of presents) in Hong Kong and coming 5 in different locations in Asia, the company shows its great ambition.

Besides, it is also the biggest European integrated telecommunication operator by market capitalization, among the 40 largest companies in the world by market capacity, and among the 100 largest companies in the world by revenues by operating in 25 countries.

It’s a good opportunity to take this company as a sample to investigate for the research purpose. On one hand it’s a huge organization with plenty of resources, on the other hand it’s facing the pain of transformation in order to be more efficient, cost-effective and ultimately higher competence in the field.

4.2 Business unit introduction

International wholesale business unit (TIWS) plays a role of integrating management of the corporate’s international business along with its supporting network. The TIWS gathers inbound international traffic, provides a single interface for international carriers where the group has presence. Thanks to the quick technological revolution and heavy competition, the group found out that it needs a centralized interface to meet all the international customers’ needs, which can not only support the group’s broadband strategy by meeting its growth demand, but also can maximize return on existing assets (ROI, including Opex and Capex management), foster the group’s synergies and provide global scope to the new mobility services, VoIP and
broadband. With this vision and mission, the TIWS has been outperforming in the last years despite the financial crisis outside the door. It has a growth of more than 10% each year in terms of volumes and profitability.

ISBU is the core business unit within TIWS; it is short for International Services for corporates Business Unit, and is dealing with corporate businesses among the local Telespain branches. For the core business, currently the entire organization is arranged according to geographical distribution. The whole business zone is divided into three major parts:

- International service department of America and Asian-pacific (AMEP);
- International service department of Europe, Middle East and Africa (EMEA);
- International service department of Spain, traditionally the biggest market for the company;
- International service department of carriers.

Within each department, the content is more or less the same. The team consists of presales, quotation and ordering entry, and project manager. As the customer the business unit facing is only Operational Business (OB, which means local Telespain branch, such as Telespain branch in Germany), meaning the local Telespain branches in different countries, and usually the organization doesn’t face the end customer, so the presales team plays the role of Sales in other companies, works together with the sales team of OBs. Besides, there are also two other teams who help with the core business: internal management and operational marketing.
4.3 Service delivery process

As ISBU is in charge of international corporate services business, not facing directly to the end customer, which means the core responsibility is internal communication within the entire corporate, so usually the customers and certain portion of suppliers are Telespain branches (OBs, of course in many cases the company has to “borrow” network from outside carriers, especially for off-net countries). Briefly speaking, the standard end to end service delivery value chain within ISBU is as follows:

1. Receive Request For Proposal (RFP) from OB;
2. Presales team validate the commercial plan, and create a billing plan;
3. Quotation team validate the technical solution, send Request For Quotation (RFQ) to suppliers, make quotation;
4. After confirmation from the OB, assign a project manager, and start project with internal kink-off, including last data checking, ordering placing and resource allocation;
5. Provisioning and last-mile-connection, milestone: Ready-For-Service (RFS);
6. One week for the customer to do the testing, milestone: Ready-For-Billing (RFB);
7. Start of service delivery.

All steps of process are done by different teams that are under different managers, hence assorted departments. In theory, the information flow is one way only, which means the process is going on along with the update of information system (naming SIGMA); while in reality, there are a lot of repetitive work, back & forth and pushing for the job done etc. When the information is updated or changed from upstream, the whole process sometimes has to run over again.

For example: When an OB in Germany receives a RFP from an international retailer who requires VPN MPLS connections for its 20 offices all over the world, the sales team in Telespain Germany will contact ISBU presales (who is located in Germany as well) immediately for getting a commercial offer to answer the request. The presales will transfer all the information including commercial conditions and technical requirement back to Madrid office, asking for a RFQ. As soon as the RPQ arrives at quotation team’s hands, the data is checked then send separately to two groups: for off-net countries to the local Business Technical consultants (BTCs) who are in charge of the exact countries; for the on-net countries and off-net countries with closed contract to the quotation team in Madrid to check the price. When the quotations are collected, the quotation team needs to do the first round vendor selection according to experience, negotiate for a lower price, then hand the result over to presales, presales to OB, OB to end customer. In case of shortlisted, another round of price negotiation is required in order to make the offer more competitive than the competitors. So the information flow will go the same route once again (perhaps several times) until the bid is finally won (or lost). After winning the bid, presales, quotation, project management and provisioning sit together to have an internal kick-off meeting, indicating the project is officially started. Then orders are placed to vendors by procurement team, the provisioning team starts to work for the provisioning and last mile connection until reaches the stage of RFS. After acceptance, the project is RFB, the service management takes over the project, and here begins the service contract period (billing period). An indicative process flow is as Figure 11.
During the interviews and project participation, the author got to know better and better how the system works, in the meantime, more and more problems are revealed just like the tip of the iceberg. Same as Staats et al (2011), “We’ve found that knowledge workers tend to grossly underestimate the amount of inefficiency that could be eradicated from their jobs. The key is to get everyone in the organization to systematically make waste visible and do something about it.” People who work around the process may already get used to it, have no feeling about all the pre-set steps, and close theirs’ eyes to the procedures, no matter they are fair or not, reasonable or not. Therefore as a freshman, it is the author’s responsibility to open the Pandora’s Box and make the waste shown to everyone’s face. In this chapter the author will take a deep dig in the process of different teams, analyze the value stream map, and calculate some KPIs based on certain assumptions.

4.4 Execution of interview

Basically what the author uses in this research is a combination of all mentioned methods in chapter two, among which the semi-structured interview is the most important primary source of information and archival data analysis as secondary source. It is discussed in detail here how the interview is designed and executed.
4.4.1 The interview execution framework

Baxter et al (2008) hold the opinion that both Stake and Yin refer to conceptual frameworks, but fail to fully describe them or provide a model of a conceptual framework for reference. One resource that provides examples of conceptual frameworks is Miles and Huberman. They note (1994) that the conceptual framework serves several purposes:

- Identifying who will and will not be included in the study;
- Describing what relationships may be present based on logic, theory and/or experience; and
- Providing the researcher with the opportunity to gather general constructs into intellectual “bins”.

![Diagram of case interviews]

**Figure 12** A schematic diagram of case interviews

1. Agreements: Same goal is reached for the company management and the author for the research purpose, with which comes the cooperation of stakeholders;
2. Diagnosis: Pre-study of background information, including industry and company investigation;
3. Setup of knowledge: Literature review reveals recent findings and popular opinions;
4. Action: Interviews with employees and participation with the whole process flow are two major ways of collecting the information;
5. Feedback. Review the work done with the participators is a necessary step.

It is suggested by Crute et al (2003) that the primary research combines qualitative and quantitative data. The qualitative research begins with semi-formal interviews with managers and employees in all departments. Having examined the parameters in the literature that indicate lean criteria, a range of current statues of operational processes as well as the
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

historical data are examined and compared with each other. Afterwards the wastes are identified and corrected by the solution proposed.

4.4.2 The design of interview

The semi-structured interview has three major purposes: define the process, identify the waste and measure the workload. It’s designed with open questions for the purpose of collecting as much divergent thinking of interviewees as possible.

- **Define the process**: it’s the most important task of the interview. To know how the project is going through at each stage of its life cycle is the basic bricks to build the current value stream map;
- **Identify the waste**: during the interviews, the employees usually would like to complain about the difficulties in their job. The description of the problems can be considered as part of the waste, they are collected and analyzed for the root cause;
- **Measure the workload**: based on the resources have on hand and the individual workload, it’s easy to calculate the takt time and other KPIs for purpose of optimization, and result in the actual required resource needed by the company.

4.4.3 The execution of interview

The interview is executed according to the predefined Gantt and with the help of the internal coordination by management. Depends on the difference in size of the team and expected number of employees, the author dedicated from 1 week to 3 weeks to carry out the interviews, summarize and review the result.

- **Carry out of the interview**: With the coordination of the management, the interview is carried out based on the predefined time and location between the author and the interviewee. Usually the interview lasts around 2 hours, during which firstly the author shortly introduce himself, secondly ask questions from the interview questionnaire, finally let the interviewee express his/ her own ideas;
- **Interview summary**: After the interview, it is necessary to summarize the result of the interview and make reflections. When more questions come up, they are written down and sent for the answer. A separate value stream map is done for each team;
- **Interview review**: Another appointment is made later between the author and the interviewee to go through the value stream map and to make sure the interviewee’s idea is completely and precisely in black and white;
- **Review with management**: Meeting periodically with the management to report the progress, clarify some doubts and assure a common view is reached between both parties.
4.4.4 Interview protocol

The total human resource of the department is shown in Figure 13. The number of employees varies from team to team, but naturally the number of manager is always only 1 for each team.

![Diagram showing human resource in the BU](image)

**Figure 13 Human resource in the business unit**

**Note:**

- The temporal interns are not taken into consideration when calculating the number of employees.
- Ordering team a special presence, it is relatively small because this team only deals with some VIP customers. It will be explained in detail later in chapter 5.

During the interview, the author interviewed in total 21 employees of the business unit out of 95 human resources available within the teams, makes up to 22.1%. Within the interviewees’ portfolio, there are 5 managers, accounting for 23.8%, and 4 female employees, which is 19% of the interviewee pool. A detailed distribution is shown in Table 3 and Figure 14. (M=Male; F=Female)

<table>
<thead>
<tr>
<th>Prime Interviewee</th>
<th>Secondary Interviewee</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Position</strong></td>
<td><strong>Gender</strong></td>
</tr>
<tr>
<td>Presales</td>
<td>Manager</td>
</tr>
<tr>
<td>Quotation</td>
<td>Manager</td>
</tr>
<tr>
<td>Ordering</td>
<td>Manager</td>
</tr>
<tr>
<td>PM</td>
<td>Manager</td>
</tr>
<tr>
<td>Procurement</td>
<td>Manager</td>
</tr>
<tr>
<td>Provisioning</td>
<td>Manager</td>
</tr>
</tbody>
</table>

*Table 3 Interviewee composition*
4.4.5 Semi-structured interview questionnaire

A questionnaire consists of several groups of questions presented to a respondent for answers. There are three basic types of questionnaires: well-structured, non-structured and semi-structured. As well-structured questionnaire is not flexible while a non-structured one is too loose to control, a semi-structured one is suitable for this research.

The sample used by the author is shown as below. It has mainly five sections: to have a clear understanding of the process, the documents, the deliverables, the workload and the suggestions. There are several questions listed under each section work as outlines to inspire the interviewees. All these questions are defined with one single goal: define the process and identify the waste. As the responsibility and work flow of each team varies, the questions asked during the interview also changes from time to time. The extra information provided by the interviewees is also recorded by the author in order to get a better understanding for the research.

This questionnaire is mainly used for employees, for the managers who are usually interviewed before their team members, the five outlines are used to guide the interviews for a clear previous understanding of the teams.
<table>
<thead>
<tr>
<th>Mission: Identify Waste, define Process</th>
<th>Interviewees</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Process</strong></td>
<td>#1 #2</td>
</tr>
<tr>
<td>What's the normal daily working scope?</td>
<td></td>
</tr>
<tr>
<td>Who are mainly contacted? Give rough distribution</td>
<td></td>
</tr>
<tr>
<td>Processing steps &amp; average processing time</td>
<td></td>
</tr>
<tr>
<td>Is there any guidelines? Are they followed?</td>
<td></td>
</tr>
<tr>
<td>What's the decision making process?</td>
<td></td>
</tr>
<tr>
<td>Is there anyone taking care of specific customer?</td>
<td></td>
</tr>
<tr>
<td>#employees? How are the work distributed</td>
<td></td>
</tr>
<tr>
<td>Is there any controlling toll gate? Effective?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>2 Documents</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What/ Where are the documents?</td>
<td></td>
</tr>
<tr>
<td>How often do they get updated?</td>
<td></td>
</tr>
<tr>
<td>How often is others’ update checked?</td>
<td></td>
</tr>
<tr>
<td>Do you think they are easy to use?</td>
<td></td>
</tr>
<tr>
<td>Are you satisfied with the tools you have?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>3 Deliverables</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the required deliverables?</td>
<td></td>
</tr>
<tr>
<td>What kind of info do you usually fill in?</td>
<td></td>
</tr>
<tr>
<td>Can you always deliver them on time? If no, why?</td>
<td></td>
</tr>
<tr>
<td>Have you ever forgotten informing some stakeholders? Does that happen a lot?</td>
<td></td>
</tr>
<tr>
<td>Have you ever pushed upstream while been pushed by downstream? Does it happen a lot?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>4 Difficulties/ Workloads</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the main problems?</td>
<td></td>
</tr>
<tr>
<td>Do you often push others / get pushed?</td>
<td></td>
</tr>
<tr>
<td>Do you get stressed because of others' fault?</td>
<td></td>
</tr>
<tr>
<td>Do you feel overloaded? If yes, how often?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>5 Suggestions</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you satisfied with the current status?</td>
<td></td>
</tr>
<tr>
<td>Do you identify any waste?</td>
<td></td>
</tr>
<tr>
<td>Who is responsibility do you think they belong to?</td>
<td></td>
</tr>
<tr>
<td>Do you have any suggestions?</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 Questionnaire for the interview
5. Analysis of current service delivery process

This chapter is the key chapter of the research. The author analyzes the as-is state of the service delivery process by using two tools: archival data analysis and VSM. The results tend to be complements and corroborate each other.

5.1 Archival data analysis

In order to know better the condition of historical Service Level Agreement (SLA, mainly refers to process time and lead time here) of by-past projects, the author extracts the archival data from the SIGMA database using the following criteria:

- Dates from 1st January 2009 to 31st December 2011, last three years in total 9524 lines that finished by the ISBU;
- Covering all types of services provided to the customer;
- Not taking into account of projects that are still on-going, in inquiry stage or execution stage;
- The project life cycle starts with acceptance of commercial offer, ends with RFS, meaning the process time and lead time of presales and quotation team is not included.

The finding of deep digging in the database can be used to compare with the interviewees’ estimation, know more accurate the “exact” time spent on each stage of the historical projects and decide which project type can be used as the major research object. Some of the analysis results are intended to support the assumptions in the VSM analysis and it can play a role of warm-up to help the readers to gain better understanding of the research content.

But there are also some errors in the database can’t be reasonably explained. Such as when it shows the process time is “0”, it could be that some projects don’t need certain process, or the value is missing in the database. Not to mention the data noises, long tails, etc., all these lower the credibility of archival data and make it only a reference to the VSM.

5.1.1 Projects categorization

In general, 14 different services make up the company service portfolio, and the number of each type (in lines) is shown in Table 5 and Figure 15. It is concluded that VPN-MPLS SITE is the most frequently provided services to the customer, which makes up to almost 70% in volume for only VPN-MPLS SITE, and close to 80% if add all VPN services together (the basic services are the same). Therefore, it can obviously be considered as the core service and is suitable to be analyzed as the main object in this research. (Note: Usually the MOBILE service is not operated through the SIGMA system, and the number showed here belongs to some specific huge
projects which go together with the VPN service. It means, the actual percentage of VPN-MPLS service is lower if putting all MOBILE values into the pool.)

<table>
<thead>
<tr>
<th>Service type</th>
<th>Number of Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection Carrier ATM</td>
<td>2</td>
</tr>
<tr>
<td>Connection Carrier FR</td>
<td>6</td>
</tr>
<tr>
<td>Connection GBS</td>
<td>63</td>
</tr>
<tr>
<td>Connection IPsec</td>
<td>169</td>
</tr>
<tr>
<td>Connection VLL</td>
<td>11</td>
</tr>
<tr>
<td>Fixed Voice Service</td>
<td>9</td>
</tr>
<tr>
<td>Gateway MPLS</td>
<td>131</td>
</tr>
<tr>
<td>Generic</td>
<td>775</td>
</tr>
<tr>
<td>Generic MNC</td>
<td>47</td>
</tr>
<tr>
<td>Generic Satellites</td>
<td>50</td>
</tr>
<tr>
<td>Mobile Service</td>
<td>1203</td>
</tr>
<tr>
<td>VPN MPLS</td>
<td>514</td>
</tr>
<tr>
<td>VPN Service</td>
<td>9</td>
</tr>
<tr>
<td>VPN-MPLS SITE</td>
<td>6535</td>
</tr>
<tr>
<td><strong>Total general</strong></td>
<td><strong>9524</strong></td>
</tr>
</tbody>
</table>

Table 5 Number of projects based on service types

![Pie chart showing the percentage of finished projects type 2009-2011](image)

Figure 15 Percentage of projects based on service types
5.1.2 Projects life cycle analysis

Average lead time and process time of different type of projects (in days):

<table>
<thead>
<tr>
<th>Service type</th>
<th>Lead Time</th>
<th>Ordering Time</th>
<th>Provisioning Time</th>
<th>Incident Time</th>
<th>Total Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection Carrier ATM</td>
<td>61</td>
<td>0</td>
<td>61</td>
<td>2.79</td>
<td>124.79</td>
</tr>
<tr>
<td>Connection Carrier FR</td>
<td>98.33</td>
<td>0.00</td>
<td>97.67</td>
<td>6.83</td>
<td>202.83</td>
</tr>
<tr>
<td>Connection GBS</td>
<td>73.48</td>
<td>2.86</td>
<td>69.86</td>
<td>5.48</td>
<td>151.67</td>
</tr>
<tr>
<td>Connection IPsec</td>
<td>73.43</td>
<td>7.70</td>
<td>63.37</td>
<td>17.65</td>
<td>162.14</td>
</tr>
<tr>
<td>Connection VLL</td>
<td>71.27</td>
<td>1.45</td>
<td>69.55</td>
<td>13.62</td>
<td>155.90</td>
</tr>
<tr>
<td>Fixed Voice Service</td>
<td>42.89</td>
<td>0.44</td>
<td>42.44</td>
<td>0.00</td>
<td>85.78</td>
</tr>
<tr>
<td>Gateway MPLS</td>
<td>27.38</td>
<td>0.30</td>
<td>23.33</td>
<td>24.36</td>
<td>75.37</td>
</tr>
<tr>
<td>Generic</td>
<td>61.09</td>
<td>6.02</td>
<td>49.22</td>
<td>24.12</td>
<td>140.46</td>
</tr>
<tr>
<td>Generic MNC</td>
<td>83.77</td>
<td>3.21</td>
<td>77.81</td>
<td>40.09</td>
<td>204.87</td>
</tr>
<tr>
<td>Generic Satellites</td>
<td>18.44</td>
<td>0.00</td>
<td>18.44</td>
<td>0.00</td>
<td>36.88</td>
</tr>
<tr>
<td>Mobile Service</td>
<td>16.82</td>
<td>0.67</td>
<td>14.74</td>
<td>15.61</td>
<td>47.84</td>
</tr>
<tr>
<td>VPN MPLS</td>
<td>21.28</td>
<td>1.92</td>
<td>10.25</td>
<td>23.25</td>
<td>56.70</td>
</tr>
<tr>
<td>VPN Service</td>
<td>39.00</td>
<td>0.00</td>
<td>38.89</td>
<td>0.00</td>
<td>77.89</td>
</tr>
<tr>
<td>VPN-MPLS SITE</td>
<td>93.33</td>
<td>9.39</td>
<td>79.68</td>
<td>29.93</td>
<td>212.33</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>75.19</strong></td>
<td><strong>7.30</strong></td>
<td><strong>63.71</strong></td>
<td><strong>28.24</strong></td>
<td><strong>174.45</strong></td>
</tr>
</tbody>
</table>

Table 6 Average project life cycle

Average project life cycle 2009-2011

Figure 16 Average project life cycle
The figure shows different types of services have different life cycle at each stage. The time it takes to finish a line varies from 37 days to 212 days, at the average of 174.45 days. The major research object of this research, the VPN-MPLS SITE has the longest project life cycle and is among top variable projects. These features prove that it is reasonable to select VPN-MPLS SITE as the research object.

5.1.3 The VPN-MPLS SITE projects analysis

In the database, the SLAs are categorized into 4 different times:

- Approval Lead Time: Here lead time refers to the time gap between the Commercial Offer and Provisioning Order, includes the time of information collection, data double check, internal kickoff and waiting for approval.
- Ordering Time: The order is officially accepted after the customer signed the contract. It takes time to input data, go through the procedure and be internally approved.
- Provisioning Time: Provisioning time refers to the time gap between the moment the provisioning offer is created and the moment it is closed.
- Incident Lead Time: It means the lead time due to any problem happened during provisioning period that important enough to stop the provisioning order in SIGMA, such as relocation of customer site, missing essential installation information from customer, etc.

Step 1: Lead time distribution. Due to the different attribute of Business-As-Usual (BAU) or special lines, two peaks are found in the distribution curve, respectively around 20 and 80 days.
Step 2: Ordering time distribution. In most cases, the process is done within one day as shown, but in extreme cases it could be up to 16 days (There are some piecemeal cases with more than 16 days that should be considered as noise due to poor maintenance of database).

![Ordering Time Distribution](image)

**Figure 18** Project ordering time distribution

Step 3: Provisioning time distribution. Provisioning time varies here from 1 day to 1.5 years, but most of them are positioned between 10 to 130 days. Compared with the result from the interview that the average provisioning time is between 42 to 64 days, the data here is more precise and in larger scale, but it also shows the interview result is trustable.

![Provisioning Time Distribution](image)

**Figure 19** Project provisioning time distribution
Step 4: Incident lead time distribution. In around one third cases it doesn’t happen, but in extreme cases it can also delay the projects as long as eight months.

![Incident Lead Time Distribution](image)

**Project lifecycle distribution**

The offset normal Gauss curve shows the majority of the lines are finished between one month and six months, but the tail is long enough to reach almost three years. The project lifecycle distribution can be roughly divided into three parts:

- From 0 to 60 days, it’s the steep increasing part of a typical normal distribution;
- From 60 to 300 days, it declines as the duration increases;
- While from 300 days upon, most of the data are errors in accordance with the interview result. Due to the quality of the database maintenance, there must be a lot of noises in the long tail.

The figure shows there are quite a lot of lines are done in 60 working days, afterwards the possibility and number of lines staying at each area is declining sharply, with an average project lifecycle of around 150 days.
5.1.4 Archival analysis summary

Through the archival data analysis, VPN-MPLS SITE project is selected as the research object. The analysis not only provides the reason behind the research object selection, but also reveals the current status of SLAs, for instance the distribution of project lifecycle, which can be used to analyze the origin behind the curve shape, identify the root cause for each “abnormal” cause, improve the future value stream, check the possible improvement after lean implementation, and furthermore, it can also be used as a reference tool to double check the accuracy of the interview result.

The archival data maintenance is not bad compared with many other companies that the author knows. But there are still a lot of problems, such as repetitive data, missing data and status doesn’t match with the reality, etc. Besides, how to marshal the huge amount information in the database remains troublesome. From time to time, the author turned to the database administrator for information update, only found out he was overloaded with settings and configurations and not willing to check the completeness and accuracy of the data, especially when talking about the historical ones several years ago. Perhaps the management is focusing on the present state, and little attention is paid to correct the historical data that has no obvious value. But still, despite all these negative points, it is a good reference to measure the organizational performance.
5.2 Value stream mapping for teams

First step of current value stream mapping is to investigate the process of each single team of the service delivery process. KPIs and assumptions are presented in the first place.

**KPIs measurement**

- **Takt time**: One of the most important concepts in lean. It measures the ability and capability of the system to satisfy the customer demand, means the number of operating minutes in a day, divided by the number of units of smoothed customer demand. While it is quite obvious and easy to observe the take time in a production system, it's more difficult to calculate the take time of a service delivery system. Usually a service delivery system involves multiple completion stages, information exchange nodes, and often contains loops which resulted by customer error or incomplete specification, the task times may be either long or short while the variable from case to case, such as the call center services, logistics, health care, education, software development, consultancy, maintenance and public & professional, etc.
- **Process time**: The time it takes to actually perform the one stage of the process, if one is able to work on it uninterrupted. It includes task-specific doing, talking and thinking.
- **Lead time**: The elapsed time from the time work is made available until it’s completed and passed on to the next person or department in the chain.
- **Activity ratio**: The percentage of time that certain work is done by person or “thing” passing through the process.
- **Complete and accurate ratio**: Percentage of time downstream customer can perform task without having to “CAC”: Correct information or material that was supplied; Add information that should have been supplied; Clarify information that could have been clear.
- **Rolled first pass yield (RFPY)**: The product of all Complete & Accurate ratios time together, shows that out of one hundred occurrences, the number of times that data/material/people with no rework required.
- **Workload distribution**: D. Corti et al (2006) mentioned that the identification of the system bottleneck is allowed by the introduction of a critical load index aimed at comparing the total workload in a certain period of time with the available capacity for every resource type. This concept is applied in this research to identify waste.

**Key assumptions**

- All the biddings can be categorized into three kinds: standard service, standard service plus special solution and tailor made solution. The first two categories make up to 80% of the total customer demand, 70% of the total value and 40% of the workload; while the last one makes up only 20%. Based on archival data analysis, this research is mainly focused on the this category: BAU VPN-MPLS SITE;
In reality, companies often have to manage multiple projects and value streams at the same time, some of them are depending on each other while others competing for resources. This creates additional management challenges and potential for waste. This issues are important but not in the scope of this research;

Employees work 8 hours per day, 5 days per week and 21 days per month;
Managers are not taken into consideration of available capacity, due to their important role of connecting node in the organization;
With consideration of the country tradition and company culture, the work saturation for all employees is set around 0.8;
50 lines of RFP/RFQ per case and 1 offer per working day per customer according to database and experience in EMEA area;
Winning rate is around 5%, therefore when the customer demand for the teams of presales and quotation is 1 offer per day, then the teams afterwards including PM, procurement, provisioning is 0.05 offers per day, equals to 2.5 lines per day;
In the resource calculation, as presales, ordering and PM are located related to customer while quotation, procurement and provisioning are located related to vendor; the first group is calculated based on EMEA and the later one based on the whole world;
For the convenience of calculating current value stream map and future value stream map, the customer demand is set to be 1 offer per day;
It makes more sense to calculate the process time for ordering team based on number of lines, because no matter how high the synergy it is from case to case, they have to fill in the system line by line independently;
It makes more sense to calculate the process time for other teams based on number of offers, because for the lines within an offer with high synergy it saves a lot of time to do the copy and paste;
In case of lead time, it makes more sense to calculate based on customers, because no matter how many lines a customer asks for, the lead time is always set by the customer, which means in many cases it is the same for the lines within one single project (except certain lines have specific requirement for locations);
Since it is always impossible to have 100% information at the first place from the customer/ end customer, during the calculation, 100% C & A means the information on hand is enough for the current stage;
Minimum and maximum lead time are provided by the interviewees and estimated based on experience;
Workloads are equally distributed among all employees, which means neglecting differences in positions which are assigned according to geographical difference, and count the coordinators into the calculation as well;
Extreme cases ( for some huge projects, the lead time from RFP to bidding result may take as long as one year and a half ) are deducted from the calculation;
Comparing with the standard procedure published by the company, the result of interview shows the process is somehow different from time to time. In this research the most frequent situation is considered;
Milestones are considered as 0 Hours-taken process.
5.2.1 Team 1 - Presales

Responsibility

Contact with customers, Operational Business (OB) in case of presales here, and business-end customer in the case of OB sales with the objective to win bids. They share the same functionality while face respectively internal and external customers.

1. When receive a RFP, the presales contact customer to collect all the available information and match the customer requirement with the service that the company can provide, put them into different categories, fill in the excel TIWS template, create a service request and send it to the quotation team, IT service and partners for the RFQ;
2. After getting the quotations, review the information and create pricing offer based on the commercial bid which is validated by the quotation team. In case of above certain amount of contract value, a business case is required according to the company policy and a discussion together with OB and finance department is needed (depends on value, this case makes up to 60% in volume), after approval, the presales can go for bidding;
3. When the bid is shortlisted and the customer requires for a more competitive offer, the whole process above mentioned has to go over again to see if it’s possible to bargain with the vendors. The number of back and force depends on the number of rounds for bidding and result of negotiation as well;
4. After winning the bid, create and pass the Order Form (OF) as well as Profit and loss sheet (P & L) and Service Level Agreements (SLAs);
5. When everything is ready, a kick-off meeting will be held between presales, quotation, provisioning and project manager. Presales are done with their job, but in case of any missing information, further support should be provided to the other teams.

Resources

The presales team is organized based on the geographical location of customers: under the manager EMEA, there are two presales in charge of UK and Ireland; three presales based on Germany take care of Europe; and four presales based on Spain are dealing with other countries within EMEA.

They use the information system of SalesForce, Microsoft Office and SIGMA.

![Figure 22 Human resource of presales](image-url)
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

Value stream mapping for presales

<table>
<thead>
<tr>
<th>Presales</th>
<th>Hardcopy</th>
<th>Softcopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGMA</td>
<td>Excel/Outlook</td>
<td>SalesForce</td>
</tr>
<tr>
<td>Translate customer language, categorize services</td>
<td>Collect info</td>
<td>RFP from OB</td>
</tr>
<tr>
<td>Wait for Quotation</td>
<td>Wait for OB Finance</td>
<td>Excel/Outlook</td>
</tr>
<tr>
<td>Excel/Outlook</td>
<td>SalesForce</td>
<td>Excel/Outlook</td>
</tr>
<tr>
<td>Bid for project</td>
<td>Ask for better price</td>
<td>Bid for project</td>
</tr>
<tr>
<td>Make OF, P&amp;L, SLAs</td>
<td>Wait for other teams</td>
<td>Kick-off meeting</td>
</tr>
<tr>
<td>Project Management</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C & A 60% 100% 100% 100% 100% 100% 100% 80% RFPY

Lead Time 0.55 Days 2.75 Days 15 Days 3 Days 15 Days 15 Days 53 Days 3 Days 110 Days LT

Process Time 8 Hours 9 Hours 16 Hours 8 Hours 8 Hours 5 Hours 24 Hours 8 Hours PT

Lead Time MIN 0.1 Days 0.5 Days 10 Days 1 Days 10 Days 10 Days 42 Days 1 Days 75.6 Days AR

MAX 1 Days 5 Days 10 Days 1 Days 10 Days 20 Days 63 Days 5 Days 144 Days

C & A = % Complete & Accurate
RFPY = Rolled First Pass Yield

Customer Demand = 1 Offer / Day

Figure 23 Value stream mapping for presales
KPI calculations

- **Lead Time:** $LT_{ps} = 110 \text{ Days}$
- **Process Time:** $PT_{ps} = 91 \text{ Hours}$
- **Activity Ratio:** $AR_{ps} = \frac{\text{Process Time}}{\text{Lead Time}} = \frac{110}{91 + 8} = 10.36\%$
- **Rolled First Pass Yield:** $RFPY_{ps} = 48\%$
- **Takt Time:**

$$TT = \frac{\text{Availble Time}}{\text{Customer Demand}} = \frac{\#\text{Employees} \times 8 \times \text{Saturation}}{\text{Customer Demand}}$$

$$TT_{ps} = \frac{9 \times 8 \times 0.8}{1} = 57.6 \text{ Hours/Order}$$

Distribution of daily workload

On average, a presale spends 20% of his / her time contacting with customer - OB, and use 20% of time to internal communication while the rest of the time is dedicated to paper works: filling all kinds of templates. It means, as a sum only 20% time is spent on the customer, this 20% is value adding time while the rest 20% time for internal communication is low value adding and surprisingly, the 60% for paperwork adds almost no value.

Ideally, the time distribution is expected to be 50/50: at least half of the time should spend on communicating with customers in order to build a better networking and receive more information about the future business opportunities; while the rest 50% of time talking to internal teams, doing the calculation and filling in some templates when necessary and unavoidable.

---

**Figure 24 Distribution of presales daily workload**
Confronted problems

1. There is a time gap between the lead time provided by the customer and the time it takes to request for a quotation from vendors. On average the value-adding time for presales team is around 5%-10%. Usually a customer asks for 1-2 weeks for a RFP, but it takes 2-4 weeks for the quotation team to get the quotation from the suppliers. When the answers can’t be received from vendors in time, the presales has to put in a budgetary price for the offer, which is close to a blind bid, brings with the risk of losing profit or even the bid.

2. There’s a risk of losing time at the beginning of project. Once the bidding is won, the presales sends the Order Form (OF) to the procurement team and due to the time gap, procurement has to start the whole negotiation process all over again in order to close the order, as a result another 2-4 weeks could lose within the project schedule.

3. Win rate is extremely low to around 5%, which results in high price and reluctance in quick responding from the vendors.

4. The RFQ has to be sent to quotation team, IT service and vendors differently based on the content of service request, a lot of time is spent on finding and communicating with the right contactors.

5. A lot of paperwork has to be done by presales team, which takes up a large portion of time and is a waste of resource considering the high salary of presales.

5.2.2 Team 2 - Quotation

Responsibility

The responsibility of quotation team is divided into two parts: create quotation for new projects and confirm the details for the renewed contracts.

Process for the new orders:

1. Receive RFP from presales in the form of generic codes in SIGMA together with EXCEL file, analyze the data and decide whether use pricing table or quotation tool for each requested connection. For example, it’s possible to offer budgetary price at an early stage of the project, and later, get real cost from the vendor at a client’s revision request;
2. Create Supplier Bid (SB), first selection of vendors according to the geographic requirement raised by the customer and technical solutions analyzed by presales;
3. Send RFQ to the vendors and wait for the feedback;
4. Marshal the received feedback, compare the quotation with archival data and own experience, check whether it’s reasonable and within budget or not;
5. Negotiate with vendors for better condition;
6. Consolidate the received SB, filter the vendors last time on basis of the price after negotiation and technical availability;
7. Quote the SB to OB indicating the total site cost. After winning the bid, work together with other teams on the internal kick-off.

Process for the prolong confirmation for the expired contract:

1. Double check the commercial details and technical solutions;
2. Contact with vendors to see if there’s any change, if yes, go back to negotiation phase or change vendors in the case of out of capability, if no, go to next stage;
3. Create SB in SIGMA and hand over to service management.

Resources

Business technical consultants (BTCs) are vendor interfaces in the quotation office. They are located all over the world based on the geographic location of vendors. In Madrid office there is a team of four people who mainly in charge of coordination, they also take care of the rest countries with closed-price-contract partners.

They use the information system of SharePoint, Microsoft Office and SIGMA.

![Diagram](image)

Figure 25 Human resource of quotation

KPI calculations

- Lead Time: \( LT_{q0} = 102 \text{ Days} \)
- Process Time: \( PT_{q0} = 71 \text{ Hours} \)
- Activity Ratio: \( AR_{q0} = \frac{\text{Process Time}}{\text{Lead Time}} = \frac{71}{102.8} = 8.72\% \)
- Rolled First Pass Yield: \( RFPY_{q0} = 38.4\% \)
- Takt Time: \( TT = \frac{\text{Available Time}}{\text{Customer Demand}} = \frac{\#\text{Employees} \times 8 \text{ Hours/Day} \times \text{Saturation}}{\text{Customer Demand}} \)
  \[ TT_{q0} = \frac{23 \times 8 \times 0.8}{1} = 147.2 \text{ Hours/Offer} \]
Value stream mapping for quotation

Quotation

Data check
Wait for initial reply
Wait for reply
Shortlisted
Wait for reply
Send final decision
Win project
Wait for other teams
Start of project

RFP from Presales

Analyze data, send RFQ
Negotiation
Collect & send info
Negotiate for better price
Send final decision
Preparation
Kick-off meeting
Project Management

C & A
60%
80%
100%
100%
100%
80%
38.4%

Lead Time
1.25 Days
7.5 Days
7.5 Days
15 Days
15 Days
53 Days
3 Days

102 Days

125 Days
7.5 Days
7.5 Days
15 Days
15 Days
53 Days
3 Days

71 Hours

PT

MIN
0.5 Days
5 Days
5 Days
10 Days
10 Days
42 Days
1 Days
0.5 Days

MAX
2 Days
10 Days
10 Days
20 Days
20 Days
63 Days
5 Days
2 Days

SUM
125 Days
7.5 Days
7.5 Days
15 Days
15 Days
53 Days
3 Days

73.5 Days

8.72%

Customer Demand = 1 Offer / Day

Figure 26 Value stream mapping for quotation
**Distribution of daily workload**

The information comes from the presales team directly to the coordinator, and the coordinate distribute the RFQs based on geographical difference: on-net countries and off-net countries, to BTCs all over the world. The coordinator spends around 10% of her total working time every day on coordinating and monitoring the status, which is necessary. The value adding time is only 50% (internal communication and new provider development) of the total working time. The rest half wasted on all kinds of escalations.

![Distribution of daily workload](image)

Figure 27 Time distribution of quotation daily workload

**Confronted problems**

6 In a team like the quotation one, the team members spread throughout the world, then it seems impossible to implement the lean idea that everyone trying to solve a problem should be able to see it first-hand. One case that the author experienced is that one customer is asking for RFP for MPLS service in its branches all over the world, from America to Europe and from Middle East to Asia. And there’s a time limitation of only one week to get the response from our suppliers. In this case, the BTCs all over the world are working as a team, and they aren’t just in different locations, they are in different time zones. One man is still sleeping while another is working. So the responses sometimes would even be delayed one whole day to be processed.

7 BTCs perceive differently in concepts and terms. It may due to differences in usual practice or technical know-how. In extreme cases it takes up to weeks to clarify the technical details to reach the same understanding.
The feedback received from the BTCs clearly shows the personal preferences that vary from people to people: some quotations are simply descriptions in the mail; some are part of the template; while some BTCs send back the whole file. It takes some extra time to allocate the exact information needed for the bid and input in the system.

There’s no option in the TIWS template for alternative solutions. If the solution is more than one, then it’s necessary to fill in a complete new file.

5.2.3 Team 3 - Ordering entry

Responsibility

In case of BAU, it is the OB’s responsibility to fill data in the SIGMA system. Presale and quotation team is supposed to provide information collected from customer and vendors to help with OB to fill in SIGMA.

In case of VIP customers with continuous new offer requiring, there is an ordering team working with SIGMA, who has the administration functionality with the main responsibility of data & order entry. It’s like an information processing center, receive different data from all the teams (commercial data from presales, technical solutions from project management / provisioning, supplier quotations from the quotation) and complete the SIGMA code, which ensures the fluency of the whole process while free the other teams from low value added jobs.

To check whether this model is worth popularizing for the whole service delivery process, in order to show a more broad view and more specific of how the ordering entry team works, the author investigated the ordering entry team.
Value stream mapping for ordering entry

<table>
<thead>
<tr>
<th>C &amp; A</th>
<th>40%</th>
<th>80%</th>
<th>100%</th>
<th>100%</th>
<th>100%</th>
<th>32.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFPY</td>
<td>1.25 Days</td>
<td>1.25 Days</td>
<td>7.5 Days</td>
<td>0 Days</td>
<td>7.5 Days</td>
<td>17.5 Days</td>
</tr>
<tr>
<td>LT</td>
<td>0.5 Hours</td>
<td>0.5 Hours</td>
<td>1 Hours</td>
<td>1 Hours</td>
<td>4 Hours</td>
<td>7 Hours</td>
</tr>
<tr>
<td>PT</td>
<td>MIN 0.5 Days</td>
<td>0.5 Days</td>
<td>5 Days</td>
<td>0 Days</td>
<td>5 Days</td>
<td>11 Days</td>
</tr>
<tr>
<td>MAX 2 Days</td>
<td>2 Days</td>
<td>10 Days</td>
<td>0 Days</td>
<td>10 Days</td>
<td>24 Days</td>
<td></td>
</tr>
</tbody>
</table>

**Key:****
- **TS** = Technical Solution
- **SR** = Service Request
- **SB** = Supplier Bid
- **CB** = Commercial Bid
- **CO** = Commercial Order
- **TO** = Technical Order
- **C & A** = % Complete & Accurate
- **AR** = Activity Ratio (PT/LT*100%)
- **RFPY** = Rolled First Pass Yield

Customer Demand = 2.5 Lines / Day
Resources

The ordering entry team is part of the back office. Within the team, three employees are assigned to input the data from presales for RFP, and the rest four employees are in charge of inputting data into SIGMA after the bid is won, and any escalations for the service extension. Basically this team is dealing with the inflexible system “SIGMA”.

They use the information system of Microsoft Office and SIGMA.

![Diagram of human resource of ordering entry]

KPI calculations

- **Lead Time:** \( LT_{od} = 17.5 \text{ Days} \)
- **Process Time:** \( PT_{od} = 7 \text{ Hours} \)
- **Activity Ratio:** \( AR_{od} = \frac{\text{Process Time}}{\text{Lead Time}} = \frac{7}{17.5 + 8} = 5.00 \% \)
- **Rolled First Pass Yield:** \( RFPY_{od} = 32 \% \)
- **Takt Time:** 

\[
TT_{od} = \frac{7 \times 8 \times 0.8}{2.5} = 17.95 \text{ Hours/Line} = 896 \text{ Hours / Offer}
\]

Distribution of daily workload

As for a typical employee in the team, only around 40% of the daily working time is used to input the data, while around 50% is dedicated to all kinds of escalations and rest 10% for other non-value-adding activities, such as meetings, talk to presales and project managers again and again for confirmation, unnecessarily double check the data, etc.

The escalation part adds very little value compared to the amount of time spent on it. There are generally two types of escalation:

1. Initialed by the customer, such as change of business plan, relocation of business unit, this type counts around 30%;
2. Escalations due to info missing at first hand, this case is around 70%.
Confronted problems

10 The SIGMA doesn’t allow “easy entry” for similar lines, it takes long time to fill in the entire commercial & technical details per line separately. For instance, in case of huge project (in case of more than 100 lines, which is normal for a medium size project), the repetitive work will be as high as 100 times the workload of a single line, despite the percentage of information that are the same.

11 There is a difference between an escalation happened before Ready for Service (RFS) or after due to the workload the processer has to carry on. In the case of escalations raised before RFS, the processer has to cancel the whole Service Request (SR), and recreate a new one, which means going through the whole process all over again; for the escalations after RFS, the specific area needs to be modified can be changed inside the SIGMA. Basically it’s a problem of the information system, and either the functional module or the ways of authorization can be changed to fix the issue. Some pessimist showed their opinions during the interview that nothing can be done about the system, and it would be better to focus on lowering the possibility of escalations. Considering the high possibility of escalations, it can also be considered as a point of view to optimize.
5.2.4 Team 4 - Project management

Responsibility

End to end responsibility, as long as a Master Service Agreement (MSA) is signed with a customer, a project manager (PM) is assigned based on the attribute of the project. From that point of time on, the project manager starts to receive relative information. When the bid is won, PMs begin to participate, lead the kick-off meeting and ensure the execution of the project:

1. Create Gantt schedule for the whole project, work together with all teams throughout the project lifecycle, keep milestones, and ensure the quality of delivery;
2. Work as a communication center, push provisioning team for progress update and report to the customer once every week;
3. Provide information to the boss meeting which is held every two weeks and executive level meeting held every four weeks;
4. When the provisioning is done, start a preparation call, organize meeting between the low level design (LLD) team, service management and customer technical team to prepare for the activation, the project reaches the stage of Ready-For-Service;
5. After activation is stage Ready-For-Billing, hand over the project to service management, the project is officially finished, continues with the billing period and service providing period. If there’s no objection, the RFS goes to RFB automatically in one week (five working days).
Resources

Thanks to the specialty of telecommunication industry, it’s not necessary for the project managers to go to the project site to monitor the progress every day, instead, they just need to sit in front of the screen and contact with functional teams to check the status. Project managers are allocated based on the proximity principle. One is based on Colombia in charge of projects in South America, two are based on Miami taking care of projects in north America, while the rest are staying in the Madrid office, manage the rest projects all over the world. They are assigned to projects according to different functionalities, such as one is in charge of carriers, while another one mobile, another one big customers and so on.

They use the information system of SharePoint, Microsoft Office and SIGMA.

![Figure 33 Human resource of project management](image)

KPI calculations

- **Lead Time:** \( LT_{pm} = 85.5 \text{ Days} \)
- **Process Time:** \( PT_{pm} = 119 \text{ Hours} \)
- **Activity Ratio:** \( AR_{pm} = \frac{\text{Process Time}}{\text{Lead Time}} = \frac{117}{8} = 17.40\% \)
- **Rolled First Pass Yield:** \( RFPY_{pm} = 51.2\% \)
- **Takt Time:**

\[
TT_{pm} = \frac{16 \times 8 \times 0.8}{0.05} = 2048 \text{ Hours/Offer}
\]
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

Value stream mapping for PM

Figure 34 Value stream mapping for project management
Distribution of daily workload

According to the experience of PMs, at least 30% of time is spent on pushing provisioning, which is completely an internal problem and should be avoided.

![Distribution of daily workload](image)

As one customer can require several projects at the same time and different PMs can be in charge of different projects which belong to the same customer, the actual (adjusted) number of projects and customers is different from the total sum of the table. The workload is distributed by the team leader not only consider the number of lines, but also the number of customers. Example of PM workload in week 7, 2012 is shown as Table 8.

<table>
<thead>
<tr>
<th>No.</th>
<th>PM</th>
<th>No. of lines</th>
<th>No. of Projects</th>
<th>No. of Customers</th>
<th>In progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>20</td>
<td>1</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>574</td>
<td>1</td>
<td>1</td>
<td>571</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>55</td>
<td>9</td>
<td>2</td>
<td>55</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>73</td>
<td>30</td>
<td>13</td>
<td>73</td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>111</td>
<td>21</td>
<td>9</td>
<td>110</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>80</td>
<td>15</td>
<td>9</td>
<td>80</td>
</tr>
<tr>
<td>7</td>
<td>G</td>
<td>38</td>
<td>3</td>
<td>2</td>
<td>38</td>
</tr>
<tr>
<td>8</td>
<td>H</td>
<td>17</td>
<td>8</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>9</td>
<td>I</td>
<td>28</td>
<td>4</td>
<td>2</td>
<td>28</td>
</tr>
<tr>
<td>10</td>
<td>J</td>
<td>68</td>
<td>29</td>
<td>3</td>
<td>65</td>
</tr>
<tr>
<td>11</td>
<td>K</td>
<td>97</td>
<td>1</td>
<td>1</td>
<td>97</td>
</tr>
<tr>
<td>12</td>
<td>L</td>
<td>77</td>
<td>16</td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td>13</td>
<td>M</td>
<td>128</td>
<td>33</td>
<td>12</td>
<td>127</td>
</tr>
<tr>
<td>14</td>
<td>N</td>
<td>50</td>
<td>6</td>
<td>4</td>
<td>49</td>
</tr>
<tr>
<td>15</td>
<td>O</td>
<td>87</td>
<td>26</td>
<td>12</td>
<td>86</td>
</tr>
<tr>
<td>16</td>
<td>P</td>
<td>114</td>
<td>31</td>
<td>11</td>
<td>112</td>
</tr>
<tr>
<td>SUM</td>
<td></td>
<td>1617</td>
<td>234</td>
<td>85</td>
<td>1604</td>
</tr>
<tr>
<td>Adjusted</td>
<td>1617</td>
<td>224</td>
<td>54</td>
<td>1604</td>
<td></td>
</tr>
</tbody>
</table>

Table 7 Example of project management workload in week 7, 2012
Confronted problems

12 There’s no formal way of PM assignment. Usually the team leader of PM receives a request and assigns a PM according to the historical relationship and the current workload. But it takes time and it happened once that two PMs both think they are in charge of a specific project. It may also happen that nobody takes care of a project.

13 Due to a large number of projects going on at the same time, the provisioning team usually ranks priority based on the urgency. Sometimes even PM has to talk to the team leader of provisioning in order to get the information and the progress moved. If the notification of any problems occur can be proactively sent by the system, then the 30% of time spent on pushing provisioning team for information can be saved.

14 It takes the PMs a lot of time to check the status update in the SIGMA. For instance, if it takes 2 minutes for a PM to check one SIGMA code, and he has 60 lines, then the total amount of time spent on this daily will be 2 hours. So for many PMs they don’t check all the projects every day, which results in some escalations not being discovered until 2 weeks later, brings with it more time pressure. This loss of time can be saved with proactive notification sent by the system or provisioning team member whenever there’s a stop in the system, and then the PM can track what’s happened and fix the problem on time.

15 Rigidly of the SIGMA system needs to be optimized. Even with a slightest change of the information, such as a door number of customer site, the whole SIGMA needs to be canceled and recreate again, it includes all the data input and approval process, which certainly is a monster that eats up a lot of time. Possible solutions can be: modify the system, make it more flexible to changes; or create some power users who are authorized to change certain terms in the system after the offer is validated. Any modification needs to be approved and the modifier is surely responsible for any changes so he or she will be very careful.

16 OBs also don’t consider the TIWS projects as high priority. It takes long time for the local Telespain branches to process an offer, even up to 90 nature days. In some cases when the contract was signed with end customer, the project manager already knew that it can’t meet the deadline and for sure it will be delayed for a certain period of time according to the experience. Of course PMs will try their best to push, but it’s beyond their power and hence not easy at all.

17 The single point of contact is always asked but rarely provided by the OBs. Without a proper communication plan, the PMs have to contact acquaintance one after another in order to find the right person in charge and then the update status of the project, which can be considered as unnecessary extra workload.

18 Usually it takes one week for the local OBs to approve the order, and around three weeks to go through the local process. One month passed without any substantial progress.

19 It is important to confirm the information on hand. One PM mentioned that around 30% of the problems in later stage are caused by the incorrect or incomplete information. Among them the most problem-causing part is the local contact, which if can confirm that at the beginning stage of a project, there is for sure much less trouble later on such as recreating SIGMA code.
5.2.5 Team 5 - Procurement

Responsibility

Double check the technical solution and the commercial order with the vendors and place orders. In general, the procurement department for the whole TIWS can be divided into five different groups: network infrastructure, service & works, market products, information systems and advertising marketing. The team interviewed is only in charge of VPN-MPLS service and works under group service & works.

Due to the low value of orders (one order per SIGMA code), there’s an special quick process of procurement which is supposed to be finished within 7 days compared with the general procurement which lasts on average as long as 15 days.

There is an internal control of KPIs (mainly process time) for the procurement team. An example of week 14, 2012 is given showing the order closed time based on regions. The figure shows the process time of vendors varies from one another. For instance, the vendors in north Europe response fastest at the speed of half a day, while it takes the vendors in Latin-American more than one week to close the order. Based on the comment of the procurement team members, the performance of week 14 is already much better than the past records, which makes an average of around 3.5 days to close an order. This reflects the necessity to establish certain agreement between the two parties instead of always dealing with each vendor in different ways.

![Average Time by Region](image.png)

**Figure 36 Example: Average order closed time based on regions, week 14, 2012**
Resources

Similar to the quotation, the team is organized according to geographical distributions: there are totally five employees in Madrid office and fourteen supply managers located in the local office close to the vendors. Employees in Madrid office are not traditional buyers like their colleagues for the general procurement, but work with an order and close it as soon as possible. As for the supply managers, their working scope is somehow overlapped with the ones of BTCs. 

For the general procurement, they use the information system of SAP and CARIBA spend management. But for the case team, they use e-Room, Microsoft Office and SIGMA.

Figure 37 Human resource of procurement

KPI calculations

- Lead Time: 
  \[ LT_{pc} = 7 \text{ Days} \]
- Process Time: 
  \[ PT_{pc} = 25 \text{ Hours} \]
- Activity Ratio: 
  \[ AR_{pc} = \frac{\text{Process Time}}{\text{Lead Time}} = \frac{25}{7+8} = 44.64 \% \]
- Rolled First Pass Yield: 
  \[ RFPY_{pc} = 80 \% \]
- Takt Time: 
  \[ TT = \frac{\text{Available Time}}{\text{Customer Demand}} = \frac{\#Employees \times 8 \text{ Hours/Day} \times \text{Saturation}}{\text{Customer Demand}} \]

\[ TT_{pc} = \frac{19 \times 8 \times 0.8}{0.05} = 2432 \text{ Hours/Offer} \]
Value stream mapping for procurement

Procurement

- **Receive order**
- **Check data, contact vendor**
- **Check conditions**
- **Request order**
- **Wait for approval**
- **Close order**
- **Provision / Project Management**

**C & A**
- Assign buyer: 80%
- Negotiation: 100%
- Request order: 100%
- Wait for approval: 100%

**Lead Time**
- 1.5 Days
- 2 Days
- 2 Days
- 1.5 Days
- 7 Days

**Process Time**
- 8 Hours
- 8 Hours
- 8 Hours
- 1 Hour

**SUM**
- 25 Hours

**Lead Time**
- MIN: 1 Days
- MAX: 2 Days
- 1 Days
- 3 Days
- 1 Days
- 10 Days

**C & A** = % Complete & Accurate
**AR** = Activity Ratio (PT/LT * 100%)
**RFPY** = Rolled First Pass Yield

**PT** = Process Time
**LT** = Lead Time

Customer Demand = 0.05 offers / Day

**Figure 38 Value stream mapping for procurement**
Distribution of daily workload

As the internal time limitation given to procurement team is 7 days, so usually this team only focus on the KPI of time, while the local supply managers take care of another KPI – cost. The team therefore is very sensitive to the delay of feedback from the vendors. Around half of the time is spent on waiting and pushing for the feedback from vendors, while 30% of time is used to update information in SIGMA system.

Figure 39 Distribution of procurement daily workload

Confronted problems

① Offers are sent to the team inbox every three weeks, during which time if any new offer arrives would be delayed.

② Time left to the team to process an order is limited, so they don’t have adequate time to negotiate with vendor for better offer though they always try.

③ Majority of the time is spent on waiting for replies from vendors. Some vendors can give very fast feedbacks, while others not. Sometimes the condition of contract, even the contactor is changed. In that case it takes extra time to fix the problems.

④ Working scope of supply managers is somehow overlapped with the ones of BTCs: for example, contacting vendors for quotation.
5.2.6 Team 6 - Provisioning

Responsibility

The provisioning team and procurement team are outside ISBU but within TIWS, they also face B-end customers. It has two main parts: system migration and implementation management; provider, technical and project management, all of which are for the whole TiWS. The research object here is the implementation team. The team receives information of a project from the PM, but not starts to work until an official Provisioning Offer (PO) is approved. With order closed, the team starts to do provisioning (internationally) and last mile connection (by local provisioning team), then test system and check settings after connection is done. When the system is ready, the team holds a meeting together with Low-Level-Design (LLD), service management and the customer, announcing the preparation call and activation. After stage RFS, if the end customer accepted without any doubt, the process automatically goes to the stage Ready-For-Billing in one week then is handed over to service management.

Resources

Implementation team is the one who takes care of the whole provisioning process. All of the team members are based in Madrid and work together with vendors’ local provisioning teams. They use the information system of own developed provisioning, Microsoft Office and SIGMA.

\[ LT_{pv} = 70 \text{ Days} \]
\[ PT_{pv} = 96 \text{ Hours} \]
\[ AR_{pv} = \frac{\text{Process Time}}{\text{Lead Time}} = \frac{96}{70+8} = 17.27 \% \]
\[ RFPY_{pv} = 60 \% \]
\[ TT = \frac{\text{Available Time}}{\text{Customer Demand}} = \frac{\#Employees \times 8 \text{ Hours/Day} \times \text{Saturation}}{\text{Customer Demand}} \]
\[ TT_{pv} = \frac{15 \times 8 \times 0.8}{0.05} = 1920 \text{ Hours/Offer} \]
VALUE STREAM MAPPING FOR PROVISIONING

**Provision**

- Internal Kickoff
- Receive technical order (80% Complete)
- Wait for procurement (80% Complete)
- Provisioning & last mile connection (100% Complete)
- Provision finished
- Tests & Settings (100% Complete)
- System running (100% Complete)
- Preparation calls, Activation
- Acceptance (100% Complete)
- RFS
- RFB
- Service Management

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Time</td>
<td>7.5 Days</td>
<td>7.5 Days</td>
<td>40 Days</td>
<td>7.5 Days</td>
<td>7 Days</td>
<td>70 Days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process Time</td>
<td>4 Hours</td>
<td>40 Hours</td>
<td>40 Hours</td>
<td>10 Hours</td>
<td>2 Hours</td>
<td>SUM</td>
<td>96 Hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead Time</td>
<td>MIN 5 Days</td>
<td>5 Days</td>
<td>30 Days</td>
<td>5 Days</td>
<td>7 Days</td>
<td>52 Days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C &amp; A</td>
<td>80%</td>
<td>80%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>64.0%</td>
<td>RFPY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead Time</td>
<td>7.5 Days</td>
<td>7.5 Days</td>
<td>40 Days</td>
<td>7.5 Days</td>
<td>7 Days</td>
<td>70 Days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process Time</td>
<td>4 Hours</td>
<td>40 Hours</td>
<td>40 Hours</td>
<td>10 Hours</td>
<td>2 Hours</td>
<td>SUM</td>
<td>96 Hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead Time</td>
<td>MIN 5 Days</td>
<td>5 Days</td>
<td>30 Days</td>
<td>5 Days</td>
<td>7 Days</td>
<td>52 Days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C &amp; A</td>
<td>80%</td>
<td>80%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>64.0%</td>
<td>RFPY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Key Abbreviations:**
- **C&A:** % Complete & Accurate
- **AR:** Activity Ratio (PT/LT*100%)
- **RFPY:** Rolled First Pass Yield
- **PT = Process Time**
- **LT = Lead Time**
- **Customer Demand = 0.05 offers / Day**

**Figure 41 Value stream mapping for provisioning**
**Distribution of daily workload**

The provisioning team is dealing with technical settings and configurations. But still, considerable amount of time is spent on waiting and pushing for the information.

![Distribution of daily workload](image)

**Figure 42 Distribution of Provisioning daily workload**

**Confronted problems**

④ Different vendors, especially local Telespain branches have different working processes, which makes the cooperate a loose confederation and difficult to control, follow-up projects;

⑤ A single point of contact is rarely provided by the vendors, sometimes it takes time to use private networks contact all relevant people to find out the responsible;

⑥ There’s a general control of time exceed, such as one order is in stage of provisioning less than 7 days, between 8 days and 20 days, etc. But there is no standard process time of each stage or no actions taken to reduce the process time, all are based on luck;

⑦ Some team members superpose the role of other team members (such as PM).

**5.3 Current value stream mapping**

Each section of the interview results has its specific function for further study. The rest of the research is built on the analysis of them:
Responsibilities, resources and VSMs are basis of process mapping;
KPIs and VSMs of all teams are used to form the current VSM;
Confronted problems are categorized to find their connections;
Distribution of workloads, confronted problems and KPI analysis are used together to develop the optimization solutions.

5.3.1 Current process mapping

As process map shows a clear division of responsibility & participating moment of each team, gives a big picture of how information flow moves along all these project stages, provides the fundamental information for the current VSM, and enlightens modifications for the future VSM.

There are three possible reasons of losing a bid: Two internal filters to check whether the order can be accepted or not and the selection done by the end customer. Internally, first round is checked by the presales, they compare the requirements of the customer with the internal service catalogue, see if the bid can be accepted; the second round is done by the quotation office, if there’s no suitable solutions can be found by the BTCs, the case will be rejected. Of course, if the end customer decides to accept the olive branch of other vendors, it is out of the case company’s control.
5.3.2 Problems categorization

Confronted problems during drawing the current value stream map clearly shows where the most problem-intensive areas are according to the experience of operators. They can be categorized based on the following criteria:

- Incomplete information at the first place: 19
- Process standardization: 5 7 8 12 17 3 4 5 6 7
- Rigidity of the information system: 9 10 11 14 15
Organizational coordination: ❶ ❷ ❸ ❹ ❻ ❼ ❽ ❾ ❿ Ⓚ Ⓛ Ⓜ Ⓝ ❬ ❭ ⓮ ⓯

If all the confronted problems can be weighted equally, the result drawn from the interview indicates that sequencing of problems people complain most about is as follows:

1. The obstructed internal & external communications, accounts for 41% (11/27). This category of problems weights highest means there are a lot of delays and repetitive works due to the comprehensive waste – waiting for people. Under this division, the root causes can be found if being checked carefully, such as there’s no fixed communication channel, the cooperation model among the corporate branches, and so on;
2. Difficulties because of unstandardized process, makes up to 37% (10/27), are the second highest complain-intensive areas. It shows the necessity of establishing certain control tollgate or deliverables to monitor the process;
3. Problems related to inflexible information system comprises 18% (5/27). This group of problems can be solved through doing modifications in the SIGMA and merging the existing large number of ISs;
4. Incomplete information got at the first place is only 4% (1/27). The management worried a lot about this category of problems, but it seems this problem is not what the operators worry about most. Actually the result from the interview shows the RFPY is usually not very low, it has space to be improved but certainly is not the focus of current work.

![Confronted Problems Categorization](image)

*Figure 44 Confronted problems categorization*
5.3.3 Current state value stream map

Figure 45 Current state value stream map
5.3.4 KPIs analysis

The real customer demand equals to, for presales and quotation is 1 offer per day, and 0.05 offers per day for the rest teams:

- Total Lead Time: $\text{TLT} = 183$ Days
- Total Process Time: $\text{TPT} = 211$ Hours
- Activity Ratio: $\text{AR} = \frac{\text{Total Process Time}}{\text{Total Lead Time}} = \frac{211}{183 \times 8} = 14.39\%$
- Rolled First Pass Yield: $\text{RFPY} = 30.7\%$
- Takt Time: 
  \[
  \text{TT} = \frac{32 \times 8 \times 0.8}{1} + \frac{57 \times 8 \times 0.8}{0.05} = 204.8 + 729.6 = 7500.8 \text{ Hours/Offer}
  \]

Apparently this value is extremely high.

<table>
<thead>
<tr>
<th>Metric</th>
<th>Presales</th>
<th>Quotation</th>
<th>Ordering</th>
<th>PM</th>
<th>Procurement</th>
<th>Provision</th>
<th>CVSM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Time (days)</td>
<td>110</td>
<td>102</td>
<td>17.5</td>
<td>85.5</td>
<td>7</td>
<td>70</td>
<td>183</td>
</tr>
<tr>
<td>Process Time (hrs)</td>
<td>91</td>
<td>71</td>
<td>7</td>
<td>119</td>
<td>25</td>
<td>96</td>
<td>211</td>
</tr>
<tr>
<td>Activity Ratio</td>
<td>10.34%</td>
<td>8.70%</td>
<td>5.00%</td>
<td>17.40%</td>
<td>44.64%</td>
<td>17.27%</td>
<td>14.39%</td>
</tr>
<tr>
<td>Rolled First Pass Yield</td>
<td>48.0%</td>
<td>38.4%</td>
<td>32.00%</td>
<td>51.20%</td>
<td>80.00%</td>
<td>64%</td>
<td>30.7%</td>
</tr>
<tr>
<td>Number of Steps</td>
<td>9</td>
<td>7</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Tech Turnover</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Takt Time (hrs/offer)</td>
<td>57.6</td>
<td>147.2</td>
<td>896.0</td>
<td>2048.0</td>
<td>2432.0</td>
<td>1920.0</td>
<td>7500.8</td>
</tr>
</tbody>
</table>

Table 8 Current VSM KPIs summary

- **Lead Time**: Presales and quotation works together and takes longest lead time compare to the other teams, PM and provisioning ranks second while procurement takes lowest lead time, the lead time of current value stream map is almost the sum of first 2 groups.
- **Process Time**: PM and provisioning take longest process time, followed by presales and quotation, and ordering & procurement are the simplest processes.
- **Activity Ratio**: Not surprisingly, the long-lead-time-process such as presales and quotation has relatively low AR, while procurement has a high value comparatively.
- **Rolled First Pass Yield**: The only team has a high RFPY is procurement, mainly because its duty is to close order with all information on hand. All other teams need to push for the information, makes the overall RFPY only around 30%.
- **Number of Steps**: It is quite unusual that the considered to be simple process, such as ordering and procurement also takes many steps compared with other more complex process. They are not really simple.
- **Technical Turnover**: Almost all the teams have to deal with three different Information Systems except ordering, the large number of ISs affects the organizational efficiency.
Takt Time: With the benchmarking of CVSM, the long takt time of PM and provisioning is set by the characteristic of the projects. But on the contrary, the long takt time of procurement and ordering is not acceptable, especially procurement, which has the longest takt time. Human resources can be placed to other teams, such as presales team, who with currently resources is considered to be the bottleneck of the process and overloaded.

5.4 Preliminary conclusion

As a summary of the current VSM analysis, improvements can be done from the following points of view:

- Analysis of confronted problems shows organizational coordination and process standardization is most complained area by employees, lots of improvements can and should be expected from these two points of view.

- Analysis of KPIs shows the problem of unbalanced resources distribution: the plethora of resources in procurement; lack of resources in quotation and presales. It’s possible to downsize the procurement team, relocate them to the other teams; in the meantime, size up presales and quotation team, since there’s a high workload for them and the work is cross covered, they should work more closely to each other.

- Analysis of work flow of each team shows it’s possible to relocate the workload: the labor-intensive tasks such as ordering entry can be done specifically by ordering entry team, therefore free the employees of presales and quotation to concentrate on the most value-adding part of the process;
6. Optimizations of future service delivery process

This chapter shows the reader one possible future state of the service delivery process. In order to draw an ideal future state, it is suggested to follow certain steps: current VSM analysis, alternative solutions identification, applicable solutions selection and future value stream mapping.

6.1 Analysis of current VSM

As a service provider, a desired to-be state should be a lean enterprise which is able to “do more with less”. (Jose Ramón Vela, TIWS director, 2012) To win more projects, more customers and more profit while spend less time, less resource and have fewer problems is the director’s best wish for the whole organization. All talk and no action is useless. With a clear and precise analysis of current value stream, it’s not that difficult to draw the future value stream, and afterwards, solutions are as plain as the nose on the face.

In creating the ideal future state map, it is necessary to follow a systematic procedure where the first step is answering a series of structured questions: which steps adds value in customers’ mind? Which steps can be merged to reduce process time and lead time? These questions will “allow us to come up with an ideal future state map that will help in eliminating or at least reducing different types of waste in the current system.” (Abdulmaleka & Rajgopal, 2007)

Key concept 1: value

Value is the core concept in lean as mentioned earlier. To define value more specifically from the customer point of view, it is usually seen as: time, cost and quality.

- **Time**: It’s important to have all the activities done within the time constrain. But the reality is that almost 90% of the projects exceed the time limitation, sometimes the project managers even know the project can’t be finished on time the moment they receive the order. There are several reasons behind it: the eagerness of presales to win the bid; the long lead time within the organization; or negligence of essential information at early stage, etc.
- **Cost**: Good price should be provided in order to be competitive in the market. It is always the key criteria to win a bid when the solution provided is on the average level. The establishment of a good quotation depends both on the internal cost and the strategic relationship with vendors.
- **Quality**: Good quality of service and minimal possibility of occurring problems during the implementation period, and stable good service during billing period is also expected from the customer.
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

Apparently in view of the lean principles, the more wastes exist in the process, the longer time it takes to close the issue, the higher the cost is and more problems need to be solved. These three divisions of value are connected to each other.

Every activity either adds value or not, but it should. On basis of the categorization of value adding degree, the process steps can be categorized into three different parts.

- Value-adding process: Such as providing competitive price to the customer in a minimal time;
- Low-value-adding process: Such as spending time on data entry;
- Non-value-adding process: Such as several rounds of negotiation are done by quotation team, when procurement does it again, it’s pure repetitive work. (There are cases that non-value-added seems like value-added: Administration, accounting, legal, reports, approvals, testing, inspections, transportation.)

Whether the case company can provide the end customers with the values they expect is the key to success. As mentioned in the previous chapter, there are three possible causes of losing a bid. The internal factors are affected by the technical availability, resources availability, while the external one purely relies on cost and time.

**Key concept 2: Work group dispatching**

Dispatching is based upon a distributed logic - i.e. both data and control are logically and physically scattered among several units. (Brun & Portioli, 1999) It is clear from the current VSM that the point of kickoff divides the participating teams into separate groups: before kickoff it’s mainly the presales and quotation teams’ responsibility to fix a bid; ordering is working in the meantime to input data into the information system, getting the process into smooth; afterwards procurement works as a transition to get order closed, project ready to start; then it is project management and provisioning teams’ job to fix a project. So based on the functionality, participating moment and operating duty of each team, the whole service delivery process can be roughly divided into three work groups.

- Group presales & quotation & procurement

The performance of this group defines the beginning of all projects. They contact customers and suppliers, try their best to win the bid by providing the most attractive condition. The core value adding process for presales is communication with customers, for quotation is communication with vendors and for procurement is closing the order. In theory, for the presales, the more time spent (also located closer) with customers, the higher possible win rate it is; for the quotation, the more time spent (also located closer) with vendors, the lower and more precise price can they get. And as mentioned before, the procurement team is a special simple one which doesn’t have the normal procurement function such as selecting vendors and asking for quotation. The only value-adding-process of procurement is closing
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

the order, which means normally only a signature and a stamp. It comes to the conclusion that if these three teams can work much closer, or even simply be integrated into a single “back office”, the scale effect can be triggered to the largest extent.

➢ Group ordering entry

This group is in charge of the data entry and maintenance. The SIGMA is used in the company as official internal operating platform, so it's important to keep the information complete and accurate. The information is collected and input by this team then available to all teams. The core value adding process of this team is transforming all data manually into the system. It doesn't make the whole flow more effective, but it is the formal way of dealing with information in the company. It's a labor-intensive low-value-adding process. Inspired by the existence of this team, is it possible to set up a specific ordering entry team for all projects? With the help of this team, data will be taken care of parallel with other process, not only process time and lead time is reduced, but also the high-salary employees, such as presales can be freed from the low-value-adding or even non-value-adding jobs.

➢ Group project management & provisioning

This group of people works for fulfilling the customer requirement, turning the idea into reality. They can only start to work after the first two groups finished their work and the order is officially approved. The core value adding process of this team is making the connection and solving problems, the time spent on requiring for information and meaningless reporting is totally not value added. The major problem in this working group is the bad quality of communication between the teams. In order to close the gap, it’s possible to put them work closer, or under the same dominion if it’s possible.

As a summary, the first group and the last group are extremely important value adding groups for the business. The first one fixes the order and the last one fixes the project, while data entry is a labor-intense job with low value added.

Analysis of current value stream map

It can be concluded from previous analysis of value and work group dispatching that the current VSM consists of three major work groups, with the core value provided to the customer is time, price and quality, and the masterstroke is value-adding process.

The following figure shows the result of current VSM analysis based on value and work group dispatching. The future VSM can be developed together with the analysis of possible solutions.
Analysis of current value stream map

Figure 46 Analysis of current VSM
6.2 Alternative solutions

A new process-management function does three things: it defines the rules for managing cross-functional teams and the continuous flow of production, including quality assurance; it teaches team leaders how to apply these rules; and it constantly searches for better approaches. (Womack & Jones, 1994) In the “lean service machine” (Swank, 2003), the author proposed seven design practices:

1. Placing linked processes near one another.
2. Standardize procedures.
3. Eliminate loop-backs.
4. Set a common tempo.
5. Balance loads.
7. Post performance results.

As a supplement, here the author adds “8. Ensure employees autonomy” as an extra design practice, because it’s not only the fundament of Total Quality Management (TQM) and Continuous Improvement (CI), but also one of the key theorems of lean philosophy. The above mentioned eight practices are analyzed one by one below to see if they fit the current value stream map in the case company.

Placing linked processes near one another

It is the first step of process modification. Employees must be aware that they are parts of an integrated whole process whose purpose is to satisfy the customer demand. Professor D. Corti et al (2004) proposed one way to modify the process for the manufacturing industry, which can be structured in following sequential steps.

- Step1: Identify the most critical resources: the ones with the highest probability to be overloaded.
- Step2: Select the alternative resources to the critical one among the technologically viable ones considering simultaneously the degree of criticality, the degree of correlation with the critical resource and their inefficiency.
- Step3: Update indices values.

Apparently, these steps align with Swank’s ideas and can be used similarly to develop the to-be state of the case company. Based on the work group analysis before, the linked process can be put next to each other or merged.

In practical experiences, Reijers et al mentioned (2005) that “we have had with analyzing existing business process, tasks were mostly ordered sequentially without the existence of hard logical restrictions prescribing such an order.” Sharing process is a strategic, inter-organizational process for complex collaboration contexts. The careful application of equity- and
quality-sharing principles applied judiciously to specific types of complex collaborations can improve the participants’ satisfaction with the collaboration, their perceptions of the fairness of the outcomes, and their willingness to collaborate again in the future. (D. Jap, 2001)

*Standardize procedures*

Although a company can do many things to control the variance of its service delivery, most of them fall into three main areas: managing demand, standardizing environments, and applying appropriate resources to tasks. (Harmon, Hensel, & Lukes, 2006)

Standardizing operating environments requires the most discipline, since salespeople are strongly tempted to sell as much customization as a client wants. Where possible, companies should standardize not only service product lines and tasks but also the work environments of employees and the equipment they use to deliver services. Scripted routines help eliminate errors and allow employees to emulate high performers.

*Eliminate loop-backs*

A loop-back occurs when a piece of work has to return to the previous step in order to be processed, which apparently caused double work and delays and should be avoided as waste. It’s possible that some employees need extra time to deal with the procedures and leave the downstream stations idle, which delays the processing of the flow.

Increasing estimation reliability and improving cross-functional communication could lead to reducing loop-backs. According to Crittenden et al (1993), the different types of coordination mechanisms used by companies can be classified into two categories: coordination mechanisms concerning information and communication or organizational coordination mechanisms. The former category includes communications by e-mail or phone in case of necessity, IT systems and standard documentation; while falling in the latter category there are meetings or workshops including members belonging to different departments, that can be organized periodically or on demand and specific organizational roles as a link between different departments.

As proposed by Bryan (2010), (one possible way is) to redesign the corporate calendar, along with corporate processes and protocols for how the meetings are conducted (including their length, decision-making roles, and required attendees). The redesign should encompass the creation of processes that enable the rapid surfacing and formal designation of issues considered critical. In addition, some companies have found it helpful to create a situation room — a physical place manned by support staff and connected electronically to people who can't be physically present — to serve as a hub to mobilize the information needed to enable debate to take place in real time among the appropriate decision makers.
Set a common tempo: Takt time

Research executed by Laurens et al (2009) shows that the world-class operators achieve a schedule compliance of more than 80 percent. The effective time frontline workers spend on value-adding activities is 50–60 percent, compared with an industry average of half that. Though there is a difference among industries, or even between companies, but it works well as a benchmarking to see how far away from the top performers.

The best way to increase the effective time spending on value-adding activities is set a takt time. With a common tempo of takt time for each team, the company can measure if it puts the right amount of resource at the right position. Once over resources is detected in certain department, actions can be taken to reduce unnecessary waste, and the other way around for bottlenecks.

Balance loads

All the employees working on the same project should work together as teams therefore reduce the time spent on pushing the information flow. Within a team, balanced workload distribution is essential for managers to supervise the status of the team. Superposition workload peaks and valleys is one of the successful ways to avoid problems such as employee overloaded.

Within the lean context, balance workload means balance flow: An approach to achieve continuous flow of a value stream by designing each of the roles of the value stream to statistically take the same amount of wall clock time to produce their value. The flow is balanced by adjusting the activities and resources assigned to each role to equalize their timing.

There are lessons from Software as a service companies (SaaS). Usually these companies have traffic patterns that are flat and predictable. They will typically experience regular load peaks and troughs, with occasional traffic spikes that seem to come out of nowhere. A SaaS must deal with these traffic shifts transparently in order to ensure acceptable service responsiveness and availability. A business can decide to provision ahead of time for the worst case scenario. Unfortunately, their best guess might be wrong, and the costs of acquiring and maintaining the usually idle resources can be prohibitively expensive. Also, traffic patterns and the demands across the infrastructure will change as software and the customers using it are added or change their behavior, meaning that any specialized configurations tightly tied to key components might only provide transient value and not be flexible enough for their added costs. Means must be put in place to minimize the waste while maximizing the ability of the SaaS to respond quickly to these demands. (Benefield, 2009)

Segregate complexity

Establishing parallel work stations in a value stream based on the complexity of the work performed. Each station can then be optimized for the complexity of work assigned. The key is to cluster tasks of similar levels of difficulty into separate groups with their own performance
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

goals. Once the separation is made, the turnaround time will fall. The obvious effect of putting tasks in parallel is that the throughput time may be considerably reduced.

Post performance results

A lean process requires a performance tracking system that breaks down top-level objectives into clear, measurable targets that workers at every level must understand, accept, and meet. When performance isn’t up to the standard, action is required. Tackling problems quickly and holding colleagues accountable for poor performance raises efficiency as well as morale. A lean process also tends to address the problem of “sticky” resources, prompting organizations to allocate them to shifting priorities more flexibly. (Bhatia & Drew, 2006)

As mentioned by Brandolese et al (2000), each human being is provided with a certain measure of his or her welfare - economists call it utility function - and he or she likes one situation better than another if and only if the former gives greater utility than the latter. As a consequence, the economic goal of each individual is to maximize his or her measure of satisfaction. And when the structure was the right one and the incentive plan is the glue to make the structure work. Unlike share plans which are well established, there’s no set of supplementary rules and the system is tremendously flexible. (O'Regan & Ghobadian, 2011)

Managers/supervisors must draw performance contracts with subordinates in line with the strategic plan and these should be reviewed regularly. Management should have an overwhelming commitment to the strategic plan and involve employees in the early stage of formulation so that there is harmony in the organization. (Dandira, 2011) Such as, numbers can be posted on large boards in the public places so that all employees can see when and where, and most importantly why performance was suffering. Once the bottleneck is detected, people can meet and brainstorm possible ways of solving the problems. It might be not easy for certain low performance employees at first, but eventually they will understand the objective performance record that they will be evaluated on and reward for, which is quite clear and can be traced, improved by themselves rather than by their bosses' subjective observations.

Fine et al declared (2008) the broader challenge is integrating the better-known “hard” operational tools and approaches (such as JIT) with the “soft” side, including the development of leaders who can help teams to continuously identify and make efficiency improvements, link and align the boardroom with the shop floor, and build the technical and interpersonal skills that make efficiency benefits real. Mastering lean’s softer side is difficult because it forces all employees to commit themselves to new ways of thinking and working. Bryan said (2010) many managers are reluctant to surface emerging issues early, because they fear being perceived as someone who is weak, or who cries wolf. A well-designed performance-management system, though, can ensure that the personal risk of surfacing critical issues late is much greater than the risk of raising them too early.

Ensure employees autonomy
Lean philosophy shifts problem-solving and decision-making responsibilities from supervisors and quality controllers to individual workers and teams. When there raises a problem, ideally it’s the responsibility of the person who created it to fix it, problems should be solved where they occur and as soon as possible after the moment it emerged.

In the article “Breaking the Command-and-Control Reflex”, the author expressed his idea (Landry, 2011): when subordinates aren’t sure what the boss really wants to accomplish, they don’t feel safe, and true delegation is impossible. Instead of acting autonomously, they hang around the boss and try to do whatever pleases him at the moment.

According to the finding of Tzu-Shian Han et al (2010), a positive relationship exists between employee participation in decision making and psychological ownership, and organizational commitment mediates the relationship between psychological ownership and knowledge sharing, indicating companies should allow employees to participate in decision making to make employees produce psychological ownership and organizational commitment, thus contributing to organizational benefit from knowledge sharing in the workplace. Apparently, giving employees more autonomy is the best way to raise their commitment to the organization, therefor contribute more to the company.

Management suggests control: control of process and control of environment. Command and control corporations are no longer going to be there. People need to be freed to share what they know. (Tom, 2008) It should reflect a belief that every person in the organization is responsible for contributing to the profit of entire company and should establish how that responsibility is to be shared. (Hastings, 1972) Middle management and staff functions were developed to exercise control over complex production operations. These functions can only be eliminated if control functions are transferred to self-managed work teams, which reduce the need for staff control, scheduling, and reporting, detailed operational planning. Moreover, if the flow of intermediate products connect work teams or cells through JIT deliveries, then any change or delay in any part immediately effects those cells that are connected with it, and the entire system operates as a single, integrated entity and each component is controlled, as it were, by the system itself. (Jenner, 1998)

The company should embrace change to enhance its competitive advantage; however, it should carefully align its business processes (supported with the proper implementation of IT) with its environment and assure the flexibility and continuous adaptations of its core processes. It should therefore establish which business processes are key processes and contribute to the competitive advantage. It should also specify which business processes should be standardized and where employee may have certain flexibility. (Trkman, 2010)

De Haan et al (2011) showed in their research that workers face the challenge of making the work go ever smoother by reducing waste and only performing actions that add value. And furthermore, they declare that while the potential for autonomy and the need for creativity are positively related to motivation, they are negatively related to turnover.

Lean is the bottom-up strategy to get workers involved in continuously identifying sources of waste and making suggestions to eliminate these, for instance by tapping their creativity in. (de
Haan & Overboom, 2011) Only with certain level of autonomy can the creativity be inspired and applied in daily work.

Summary of suggested solutions

Based on the above analysis, it can be encapsulated that:

- “Placing linked processes near one another”, “Eliminate loop-backs” and “Segregate complexity” guide the way of process redesign, identify and get rid of wastes;
- Follows with “Standardize procedures”, the organization can perform better with new structure or process after modification;
- “Set a common tempo” together with “Balance loads” are used to redesign the job functionality, aiming at reducing the job overlapping and rationalizing the resources.
- “Post performance results” and “Ensure employees autonomy” are focusing on leveling up the enthusiasm of employees, changing the attitude into passive response to proactive acquisition.

As a conclusion, there are four major areas to optimize. Recall the confronted problems categorization, internal communication, process standardization and problems of ISs are major headaches of employees, they also have to be taken into consideration when propose practical solutions for the case company.

6.3 Applicable solutions

With the theoretical support, six practical solutions are developed to fix the confronted problems, eliminate waste and improve the organizational performance. First four solutions are based on the specific situation of the case company from the result of interview and VSM analysis, while the last two are more general and supportive, but indispensable. All six solutions together form a continuous improvement framework. It is explained in detail below the implementation, possible benefits, risks and pitfalls.

1. IS Rigidity elimination - Merge ISs

Poirier (2005) announced that BPM is the key ingredient, as it introduces the possibility of easily sharing pertinent knowledge that helps all supply chain constituents and overcoming the problem of dealing with many different systems. The importance of IS is approved, but the major difficulty lies in if there are lots of ISs, how to make them work more efficient together.

According to incomplete statistics, due to historical reasons, different teams are used to work with different information systems. For the moment the company has to work with more than 30 different information systems (See Table 9). It caused a lot of problems in data interface, data
conversion and data maintenance. Even though the functionality varies, but according to the blueprint from the director, the SIGMA will have all the functions or at least necessary business interfaces in the near future. If all these different ISs can be merged into one (or several), then a lot of problems occurred due to interface between systems, the repetitive information input can be eliminated, RFPY can be increased and a lot of time and cost on the license and maintenance can be saved.

<table>
<thead>
<tr>
<th>Information Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
</tr>
<tr>
<td>AGSI (Gestión de Servicios Internacionales)</td>
</tr>
<tr>
<td>ARIBA</td>
</tr>
<tr>
<td>Carriers TIWS NGN</td>
</tr>
<tr>
<td>CRM: Gestión de Circuitos de Capacidad</td>
</tr>
<tr>
<td>DataWareHouse: Supervision Estadistica</td>
</tr>
<tr>
<td>EIP: Portal Ejecutivo de apoyo a toma de decisiones</td>
</tr>
<tr>
<td>eRoom: Gestión de Documentacion</td>
</tr>
<tr>
<td>eSIF: Reporting de Información de Filiales</td>
</tr>
<tr>
<td>FRANGO (Europa)</td>
</tr>
<tr>
<td>FRANGO: Sistema de Consolidación Contable</td>
</tr>
<tr>
<td>InfoWeb (AGSI)</td>
</tr>
<tr>
<td>InfoWeb (SIGMA)</td>
</tr>
<tr>
<td>iReunion: Reuniones Virtuales</td>
</tr>
<tr>
<td>MicrosoftOffice (Excel/Outlook)</td>
</tr>
<tr>
<td>NSIM: Network and Services Integrated Management</td>
</tr>
<tr>
<td>Portal</td>
</tr>
<tr>
<td>Portal del Empleado</td>
</tr>
<tr>
<td>Pricing Center - Data</td>
</tr>
<tr>
<td>Pricing Center - Mobile</td>
</tr>
<tr>
<td>Pricing Negocios VPNs</td>
</tr>
<tr>
<td>Project Server</td>
</tr>
<tr>
<td>TIWS Provisioning Manager</td>
</tr>
<tr>
<td>SalesForce</td>
</tr>
<tr>
<td>SAP (America)</td>
</tr>
<tr>
<td>SAP (Europe)</td>
</tr>
<tr>
<td>SharePoint</td>
</tr>
<tr>
<td>SIGMA</td>
</tr>
<tr>
<td>TDI</td>
</tr>
<tr>
<td>Tutorial formación SIGMA para TENS</td>
</tr>
<tr>
<td>WI: Reporting de Aplicaciones de Negocio</td>
</tr>
</tbody>
</table>

Table 9 Information Systems in the company

While some fixes must be made within the organization; others depend on shaping the behavior of customers and vendors (for instance, by offering tools and guidance to help them resolve problems themselves). In the case company, it seems quite clear: many customers as well as vendors are OBs that are parts of the whole corporate, so it would be easier to implement same information system (SIGMA, SharePoint…) among all branches. With integrated ISs, it’s more efficient and cost-effective to communicate both internally and externally, and it’s much easier to monitor the project progress and extract necessary information for report. A checklist can also be applied (see appendix) at the project early stage to do the first round information filter, thus reduce the communication cost by increasing the RFPY.

It’s possible that the employees will complain about the merging and the efficient will drop for the first couple of weeks. To keep the negative impact as low as possible, it’s necessary to train the employees, listen to their difficulties and continuously improve the information system.

2. Quotation Lead Time diminution - Quotation database
The 80/20 principle is observed: around 80% of BAU RFPs are issued to 20% of vendors. On basis of that observation, a solid quotation database can be introduced to reduce the lead time spent on waiting for overflowed information and restarting the whole process over and over again. The main change lies in the transition of working attitude from passive response to positive acquisition.

The database should be maintained by BTCs and supply managers, who ask regularly the vendors for the update of the category. The database should be used as the first-hand data to be submitted to the OBs, and cover the 80% of the RFPs of BAU from the customers, eventually decrease the reply time and the percentage of using budgetary cost to the RFP.

The future vision is a three-step-march: firstly, use the database for quotation team, and answers can be given for RFPs by single click in the database; secondly, access authorized to the presales, so in majority of the cases presales can direct answer the customers without waiting; thirdly, OBs are allowed to check the database, then for the standard projects the answer to end customer will be as fast as instant. It can be developed into three steps:

- **Step 1:** Stage of forming. Local BTCs keep on contacting with vendors for BAU catalogue, and frequently (every month, for example) update the database with the information on hand. At this stage, the database is not functioning well, workload for the BTCs will be high, they need to perfect the database and ask vendors for the quotations not available in the database;
- **Step 2:** Stage of functioning. Once the database is completely established, it’s possible to analyze raw data using certain rules, criteria, filters. The main function of back office team now can change from being pushed to ask for quotation to giving quick response to the customers;
- **Step 3:** Stage of perfecting. With well-maintained database, the OBs can have access to the database to check budgetary costs and decide immediately the possibility of winning the bid. Whenever a RFP is raised from the end customer, immediate answer can be given. The function of back-office is therefore completely maintaining the quotation database, providing fastest & most accurate quotations.

![Database concept](Figure 47 Database concept)
It requires the management high determination to change working attitude from positive to active. Supervision and performance measurement need to be done to each BTC periodically, especially during the stage of forming. Once stepped into the second and the third phase, it can not only provide with much faster response to the customers, but the employees can also enjoy the more relaxed working environment and work more efficiently.

3. **Process standardization – Team integration**

It’s normal that there is a gap between the enquiry and order acquisition stages. But considering the possible changes in the technical solution or organizational structure (stuff mobility for instance), it has great advantage to reduce or even avoid the “waste” of unnecessary waiting. According to the research conducted by D. Corti et al (2008), when an aggregate analysis is carried out at the enquiry stage, it is usually followed by more detailed analysis after order acquisition, when the uncertainty degree is lower, in order to verify the reliability degree of the proposed DD (due date). In many cases, this is necessary because a long time may pass from a customer enquiry submission to the order confirmation; during this time both the customer requirements and the state of the production system may change.

As for procurement, the core value-adding-process is just closing the orders. The team is not in the position of renegotiation with suppliers, the size of team and the job design also doesn't support, which may explain why usually it takes long time to wait for the feedback from vendors. If merged with the quotation office, the order can be closed the moment the negotiation is done by the quotation team, and then there can be one or two contacts work in the procurement team as interface to go through the process (approval).

The functionality of BTC and supplier manager somehow covers certain common areas, such as negotiation with the vendors. On basis of that, they can use the resources on hand and work together as a team on the quotation database creation and maintenance.

Using versatile employees also helps. As detected by the VSM, a lot of time and effort are wasted on contacting and pushing each other, it would be beneficial for the company if versatile employees are able to control the whole (or the majority associated part of) process, which will not only decrease resources demand on internal communication but also establish a self-control mechanism, reduce the number of process steps and the process time as well.

4. **Organizational coordination – Project manager leads team**

In order for lean principles to take root, leaders must first work to create an organizational culture that is receptive to lean thinking. The commitment to lean must start at the very top of the organization, and all staff should be involved in helping to redesign processes to improve flow and reduce waste. (Diane, 2005) The lean approach is focused on the process, but not on isolated activities. Then, the process that converges on a final client must acquire enough flexibility. This will demand, as a first item, structures that allow a right focus on the process.
That will be difficult to achieve on vertical and functional structures. On the other hand, horizontal and flat structures, born to be focused on process management and endowed with great agility and flexibility, constitute the fundamental support which enables the evolution showed in this research. As a sequence, it’s natural that the organizational chart will need to be modified with certain proper changes.

To redesign the process, the first priority is the transformation of organization from functional to process or project orientated. Responsibility and empowerment is always connected with the performance of a team and people’s behavior to each other. Currently in the case company the PM only plays a role of coordinator, he or she only collects and distributes information, doesn’t have the power to assign priorities among different work within a project, nor choose team member for projects. It is the organizational design makes it quite difficult for a PM to acquire updates from colleagues, and assign them work needs to be done, therefore it creates potential waste of time for waiting and difficulties in execution.

As a benchmarking, a PM is the owner of a project in the automobile industry. He or she leads the virtual project team, controls all the necessary resources for the project on hand, and is responsible for the whole service delivery process, solves any problems affect customer’s value, naming in budget, time frame and quality. All team members report to the PM. PM has the resources in hand and can judge the situation whenever an emergency occurs, make faster, easier, agile decisions, and nip the problems in the bud to the largest extent.

Only when the project managers are really owner of the project, in charge of the project with not only the “words”, but also the power to distribute the resources, have team members from all departments under them, can they take more responsibility, more willingness and more ability in controlling the project progress. The done implantation requires flexibility and, also, agility, on the part of the organization and on the human and material resources. However, the organization structure on companies could have difficulties to reach the appropriate flexibility level; and the resources, specially the human ones on services processes, should acquire polyvalence, multipurpose and capacity enough to work as a team, on any case indispensable. (Arbos, 2002)

One possible to-be state of the organization chart is as Figure 48:
Advantages of the new matrix organization chart with virtual project team:

- Change the organization from geographical functional to project – orientated;
- Highlight the value-adding teams, and keep the necessary but low value-adding team -- internal management the minimal size, provide support to each project manager;
- Due to geographic reasons keep the employees working together for a specific project as a team under project manager;
- Merge presales and quotation team as back office in view of their functionality, they are supposed to work together very close to each other;
- The project teams can be based on geographical distribution.

Possible pitfalls:

- There will be an internal fighting for human resources among the project teams;
- Increase the complexity of organizational control.

Campbell declared that (2011) the solution is to set a hurdle high enough so that the benefits of centralization will probably far outweigh the disadvantages, making the risks worth taking. Apparently, the power centralization of project team is worth trying.

Besides, there are another two general (supportive) solutions:

5. Win Rate accretion - Focus on core business
Win rate is always one of the most important KPIs for presales and quotation team, and is an extremely important criteria for measuring the competence of the company. Low win rate means long lead time in getting response, weak bargaining power in negotiation and high cost in subcontracting, low margin for the company, and eventually results in even lower win rate.

There are two major reasons behind the scenario of low win rate: not competitive price and low brand recognition in certain markets, especially off-net countries. In order to provide offer with better condition, a quotation database is proposed to be created and maintained. For the off-net countries, usually the company has some partners (such as China Unicom in the Chinese market), but it’s always difficult for the company to get the best price. The reason behind it is the low win rate. Sometimes the last-mile-provider of a certain bid is the same, but the price the competitor gets is lower than the one offered to the case company. To stop the vicious circle, it is necessary to start with focusing on core business, consolidating internal & external resources, outsourcing parts of the business, especially where it’s not the company’s strength to operate in, such as the off-net countries. Provide long-term vendors with some “carrots”, for example higher bargaining power to make them willing to corporate with the company with even the same contract condition.

The possible pitfall is the possibility of margin loss, but in the current telecom market, unless it’s monopolized, nobody can eat the whole cake alone. Once focused on the core business as well as core markets, and increase the win rate, the company is able to provide the vendors more business opportunities therefore overall higher profit, make both parties closer connected to each other and put the company itself on the higher position of bargaining power. It is possible to subcontract them the turnkey projects at a lower price than the ones that they provide to the other competitors in the future, and create a long term win-win situation.

Maybe the story of BT (one of major competitors) can be a little bit inspiring. In becoming a customer for its previously internal projects and spinning off nonstrategic initiatives to other firms, BT, one of the main competitors of Telespain, successfully saved itself after the telecom bubble burst in 2000. According to the firm’s chief science officer, Mike Carr, “BT needed to focus on being a top provider of network services, not on building hardware and software products. The partnership approach gives us sufficient funds to develop technology right through the marketing process.” (Chesbrough & Garman, 2009)

6. Backbone support - Senior Management commitment

Just like any other projects that launched for the benefit of the organization, it would be impossible to guarantee a success without the participation and support from the top management. In one case study carried out by Scherrer-Rathje at a international company (2009), it found out that visible and active senior management participation in the project proved a critical cornerstone for success.

Lean implementation requires patient dedication, epistemological humility, and a transformational approach. To become lean, every process must indeed be examined and
refined; but even more fundamentally, every mind must be trained for situational awareness and instinctive efficiency. As long as things could be improved, it is the role of the executive to take responsibility and make sure they are indeed changing for the better. (Hughes & Marksberry, 2011) Dr. Chamberlin (2009) also suggests that the way managers “think” is a key issue, and that if such organizations are to make a better fist of more radical change at (at least) process level, if not corporate level, then it is their “thinking” that has to change, and change significantly.

It is most difficult part. Change often brings uncertainty, loss, and pain for those it touches. (Hill & Lineback, 2011) Only when the top management realizes the importance of making a change, can the lean ideas be considered seriously and actions are implemented. Without the engagement and commitment of senior management, it makes no sense to talk about all the changes mentioned. It looks obvious but really difficult to execute in reality. Without seeing firm benefit from the future state the senior management can’t go through the throe of reform.

6.4 The Optimization Focus Matrix

All the six applicable solutions can be summarized into one matrix.

In a company providing services based on information, people and information system are two major elements generating profit, while how the business process and organization are structured decides the efficiency of the company. In the matrix, the longitudinal coordinate means the improvement focuses on process or organization, while the X-coordinate refers to operational intelligence or human intelligence is the key point of optimization. Within the coordinate system, there are four crossed interventions and one general domain:

- The aim of focusing on process and people is to reduce the job overlapping and standardize process. Actions can be taken such as team integration;
- In order to optimize the organization structure and improve internal communication, it’s necessary to concentrate on organization and people. Possible action is to empower the project manager lead the virtual project team;
- Create and maintain quotation database is a good example of knee on process and hardware, to diminish lead time and change working attitude from passive reaction to proactive acquisition;
- Merge ISs can increase the efficiency of the ISs while cut unnecessary costs together with repetitive work, it falls into the zone of organization and hardware;
- In the middle of the framework there are two general suggestions: Focus on core business and senior management commitment, they separately provide fundamental of business – high Win Rate and the basis of any organization changes – support from top management, are most important ones to ensure the sustainable competitive advantage of a company.
6.5 Future value stream mapping

6.5.1 Future process mapping

With the above mentioned optimizations, the projected future process map has three major differences compared with the current one:

- **Effect of quotation database.** With the help of quotation database, the vendors are no longer required to be member of the process map. Without the participation of vendors, a lot of time can be saved from the negotiation phase;
- **New overall ordering entry team.** Ordering entry team should be expanded and officially join the process for all projects, which can reduce workload of other teams and segregate the complexity of SIGMA entry;
- **Merge of procurement.** With the procurement team merged and its responsibility is taken over by back office, there’s no need to spend another 10 days to close the contract with vendors. This step can be deleted from the process map.
Figure 50 Future process map
6.5.2 Future state value stream map

Figure 51 Future state value stream map
6.5.3 Improvement metric

The following changes are done to the current value stream map:

- Presales, quotation and majority of procurement can work together as back office;
- It’s necessary to put a lot of effort on maintaining the quotation database, therefore the lead time of negotiating with vendors back and force for a better price can be eliminated, and instance feedback is able to be given to the customer with the best price guaranteed;
- Ordering entry is sort of isolated process from the main stream of the whole service delivery process, they can be parallel steps therefore save time for the whole process;
- All the data entry in the rigid system “SIGMA” is done by the ordering entry team, so the high-salary-employees, such as presales and quotation team can focus on the more value-adding process for the company;
- There will be several employees working in the procurement department as interface with the quotation office, in charge of order closing;
- A checklist can be used at the kickoff meeting to check the information completeness, detect problems at early stage therefore improve RFPY, attached in the appendix.

<table>
<thead>
<tr>
<th>Metric</th>
<th>Current State</th>
<th>Projected Future State</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Time (days)</td>
<td>183</td>
<td>139.1</td>
<td>23.99%</td>
</tr>
<tr>
<td>Process Time (hrs)</td>
<td>211</td>
<td>84</td>
<td>60.19%</td>
</tr>
<tr>
<td>Rolled First Pass Yield</td>
<td>30.70%</td>
<td>64%</td>
<td>108.47%</td>
</tr>
<tr>
<td>Number of Steps</td>
<td>14</td>
<td>6</td>
<td>57.14%</td>
</tr>
<tr>
<td>Tech Turnover</td>
<td>6</td>
<td>3</td>
<td>50%</td>
</tr>
<tr>
<td>Takt Time (hrs/offer)</td>
<td>7500.8</td>
<td>7500.8</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 10 Improvement metric

- Lead Time: \( FLT = 139.1 \text{ Days} \)
  It is shortened from 183 days to almost 139 days, improving 24%.
- Process Time: \( FPT = 84 \text{ Hours} \)
  It is shortened from 211 hours to only 84 hours, saving 60%.
- Activity Ratio: \( FAR = \frac{\text{Total Process Time}}{\text{Total Lead Time}} = \frac{84}{139.1*8} = 7.55\% \)
  Because the improvement of process time is larger than that of lead time, the improvement is negative.
- Rolled First Pass Yield: \( \text{RFPY}_f = 64\% \), improved more than one hundred percent.
- Takt Time: \( FTT = \frac{\text{Available Time}}{\text{Customer Demand}} = \frac{\#\text{Employees} \times 8 \text{ Hours/Day} \times \text{Saturation}}{\text{Customer Demand}} \)
  Since all elements to calculate the takt time remain unchanged, the future takt time is the same as the current one. Although the improvement of takt time is not the direct result of modification, but still potential benefits can be expected through downsizing or increasing customer demand.
- Number of Steps: Reduced from 14 to 6, improving more than 50%.
- Technical Turnover: After cutting half number of ISs, it is improved 50%.
6.5.4 Further improvements

The future value stream map is designed based on eliminating the determinate wastes identified by analyzing the current value stream map. If some other uncertainties as mentioned below can be determined, that is extra space available for improvements.

- The process time of back office team is supposed to be reduced due to the existence of “overall ordering entry team” by at least 20% based on the interview result. Here the process time remains unchanged because the merge doesn’t not happen in reality yet, and it would be too optimistic to cut the process time now;
- The lead time is still the same from the current value stream map, because in many cases it’s the process time of upstream (vendor) or downstream (supplier). In this case, almost all the lead time depends on the customer side, only the 15 days spent on waiting for approval can be improved, which due to the business security is reasonable and without much space to cut down. There are many methods to help the outside organization with reducing the existing lead time, but it’s out of the research’ scope and not discussed here;
- The IT system is reported to be very rigid and inflexible according to the feedback from the interviewees. If it’s possible to modify the SIGMA and merge other information systems as suggested, lots of improvements can be expected;
- The ratio of information accurate and complete stays the same. It is said to be very difficult (almost impossible and in the meantime unnecessary) to get the complete information at the first hand. In most cases, the information get from the OB at the first time is enough to start the project, with the rest information collected step by step as time goes by. But from the author’s point of view, if the OB can provide everything at the very beginning, then the risk is minimized immediately and the necessity of sharpening the spear only before going into battle no longer exists.
- If the win rate can be increased, the takt time of the whole company will be adjusted and it can be more efficient when modifications are done correlated to the actual situation.

6.6 Research generalization

On the strength of literature review, research result and the author’s own experience, the proposed solutions and future VSM suggesting eliminate certain existing wastes in service delivery process of the case company can also be generalized to apply to other companies, or even other industries. A general Matrix can be developed on the basis of the matrix for the case company to extend the scope of applicability. It’s also a concept based on empirical findings by using lean tools, thus whose appropriateness is assessed depending on the similarity of the features of specific company or industry and the case one.
The general Optimization Focus Matrix

It's a universal framework applicable to all companies who make a living based on the information workers. For this category of business, employees and ISs are most important profit makers, and the organization structure and the business process flow deciding the efficiency of the company. When the success of a company is based on these four factors, it can be suggested that this improvement framework is applicable. The framework structure remains the same, but considering the features of each company: historical background, industrial sector, the competitive advantage, etc., the content of detailed actions can be changed respectively into job redesign, organization structure optimization, business function integration and keep IS(s) neat and efficient, so as to suit the actual situation of the specific case with the same guidelines. It just needs to be kept in mind that the four interventions are key points for optimization in a company, and are also important factors to measure the organizational performance.

*Note: The direction of arrows is marked with star, reveals the possible (but not improved yet) internal logic of development: After introduced, the IS should be managed in a neat and efficient way and in the meantime the business process is affected, results in job redesign, the company then should restructure itself to adapt to the new business process. The internal logic remains to be studied in the future. Evidences need to be found to bolster the assumption.
Quotation database -> Business function integration

Setting a quotation database is especially useful to a service delivery company which always requires for standard quotations from the vendors. Big service portfolio but limited major provided service, almost 80% revenue comes from 20% of services is one of the case company’s key features. Generally, the importance of introducing ISs to reengineer the business process is unquestionable. It decides the competence of companies in the scientific age with globalization trend. As mentioned by Dewhurst et al (2012), continuing advances in information and communications technology have made possible new forms of international coordination within global companies and potential new ways.

Furthermore, considering the industrial background, telecom nowadays delivers services rather than products. Even though physical equipment is needed, the service delivery process is still done by humans sitting in front of the screen. The employees are considered as information workers, and the features of information work vary from a manufacturing one. The second important feature is that projects can be launched and monitored over long distance. Except the hardware installation and physical tube connection, all the configurations and settings are done remotely from the central office. It’s not necessary to move the majority of the team members to the project site. For instance, a grocery store sells large amount of different goods whose price vary from time to time and the volume of which is quite low, it is not only useless, but also unnecessary at all to use IS, or request and update frequently the quotations from the vendors.

- Applicability: Quotation database only suits the companies with large volume of BAU projects which are distributed among large number of vendors. The principle of this idea is to provide quick response to the RFP/RFQ from end customer. While introduction and optimization in ISs as a way of business function integration should be applicable to any company driven by information workers. It’s the most optimized way to allocate the organizational resources to precisely meet the customer demand and requirement.

- Risks: If quotations are frequently asked from the vendors but orders are rarely placed, the vendors might be not so willing to cooperate in the future. So it has to collaborate with increasing the Win Rate. In general case, it’s necessary to calculate the ROI of investing in ISs, including but not limited to the cost of launching, running and maintenance. Choose the best option to adjust the business function of the company to face external challenges.

Merge ISs -> Keep IS(s) neat and efficient

Solution of merging ISs is based on the features of the case company, apparently is not applicable to the ones who don’t have this problem, but only to the ones sharing the same sufferings. Considering the long history and complex background of the case company, it brings with it lots of historical issues, such as intricate organization chart, huge number of ISs, etc., which rarely happens to the other companies, especially for the small and medium enterprises (SMEs), or companies with very limited service portfolio, or who is excel in one specific service /
product or it’s unavoidable to use different ISs, merge ISs might not be a possible option at all. But for the ones with more than 2 ISs, it is time to rethink about the necessity.

- **Applicability:** Merge ISs is only for the companies with the similar obsession that the existence of a large number of ISs has pulled the legs of company development. But keep the ISs neat and efficient can help any company to free occupied unnecessary resources, reduce the communication cost and improve the efficiency.

- **Risks:** The risk to merge the ISs is quite low on one condition: the new one must function well. Besides, the work efficiency at the first stage after merging systems may drop, so the training of employees and the problems solving must be executed parallel. It’s possible to run both systems (the original one and the future new system) at the same time to exam the reliability and shut down the old one when the functionality is assured.

**Team integration -> Job redesign**

The applicability of team integration varies from company to company. As for the case one, it’s a huge international company, which means large number of employees is distributed all over the world with time difference. And due to historical issues, some teams overlap the function area. If they are working under different organizational silo, it would be quite difficult to communicate to each other for them, not to mention the complicated time-consuming approval. But job redesign can be useful to all companies even the newly born ones which are struggling in the phase of job design. The key is to avoid the work overlapping, rationally arrange the available resources and eliminate unnecessary duplication of labor in the service delivery process.

- **Applicability:** The criterion for measuring the necessity is to see whether the integration can bring down the overlapped team functionality, and reduce the communication cost between the teams. It is especially useful when a company wants to change the organization chart from vertical to horizontal, let the orders from top management much easier to be understood and executed.

- **Risks:** How to arrange the surplus team members and deal with the conflicts between the team leaders sometimes is a problem. And after job redesign, it may happen that the workload of the new organization is not equally distributed, someone will be overloaded while others taking a nap. Therefore it’s essential to remain or even improve the efficiency, creativity and participation in decision-making of the integrated new team.

**Virtual project teams -> Organization structure optimization**

For any company it is always true to be structured in a way that can exploit the potentials and function in maximum extent. And it’s also easier to communicate within a team under the same power tree, which is extremely right regarding the virtual project team, especially after job redesign. All team members come from different departments. Working culture and the leadership style of team leader in each department has huge influence on their behavior. The performance of a team is decided by the cooperation of all team members: if members
cooperate with each other well, the team will perform outstanding; otherwise the performance will be quite poor. Within a matrix organization tree, the project managers are the owner of the project and the team, they are empowered to eraser the barriers of internal communications and responsible for the whole project lifecycle. The efficiency of the team will increase because they are connected, or even committed to that project.

For instance, presales have a responsibility until the contract is signed. In case of escalations, they are not willing to provide help. Once the presales are assigned in one specific virtual project team, they feel the obligation and necessity to work together with other team members to reduce the lead time and ensure the project running smoothly. They will work more proactive not only because they share the responsibility, but also the goal of the project team. From this point of view, the virtual project team can not only reduce the lead time and cost of internal communication, but also improve the efficiency and sense of vocation of the team members.

- **Applicability:** Any company structure should be adapted to suite the actual internal situation and market requirement. It is especially useful to all project teams that aim to reduce the internal communication difficulty and increase the goal compatibility.
- **Risks:** It’s necessary to rearrange the organization chart, may bring with more complexity and potential conflicts between the teams. It’s essential to balance the relationship between the line manager and the project manager by negotiation and allocate resources in different projects.

**Focus on core business**

This idea is applicable to all business. Core business is usually the area where the company is especially good at. The case company has a problem of low win rate is mainly because of high cost and low brand recognition in some markets. Only with the major business mastered firmly and modified in the best way, can the company construct the foundation for the future development, set up its discourse power in the market, on basis of that can the company start with relative business areas and seek the new point of profit growth. Especially when considering the industry background: fierce competition and strongly related to the development of technology. The entry barrier is not so high that new arrivals is not able to compete at all (Skype is a perfect example); besides, the already existed giants in the industry are also very competitive. As the technology develops, the technical solutions are weeded out very quickly. From the operators to dialing machine, from internet to satellite, every time technology breakthrough brings with the industry shakeout. To have a loss in the core business is so heavy that no company is able to afford.

- **Applicability:** To all companies and industries, especially the ones who are not particular competitive in the core business but already look for other business and investment opportunities.
- **Risks:** Maybe it’s too cautious to miss some chances in investment to the opportunists, but doing business is not like gambling, it is always safe to proceed steadily and step by step.
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

step, only with high and stable market share of core business can the company be a bear for other business ideas.

Senior management commitment

It’s a general rule to all companies. No matter what kind of program a company wants to lunch, it can’t success without the resolute support of senior management. Especially the implementation of lean philosophy, it requires the management to give employees autonomy to implement solutions, reflect pitfalls and continuous improve the process. During the first stage of implementation there are certainly some problems, some employees may seem helpless, while others may take advantage of this opportunity. It requires the management to stick to the work firmly and guide the directions whenever it’s necessary. To throw away the child along with the bath, or to chop and change are all examples of failure.

- **Applicability:** To all companies and industries. It’s the key to any successful changes in the organization, without the understanding, participation and commitment of senior management, the barriers during execution can’t be overcame.
- **Risks:** Change is inevitably painful and risky. There’s no success without the commitment, but the commitment itself doesn’t guarantee any success. What the top management needs to be cautious is to master the right direction of any optimization within the organization. But on the other hand it’s very difficult for the management to stick to the plan due to the problems on the way of execution. Under the framework of lean philosophy, the management just needs to empower the employees to ensure creativity in problem-solving and active participation in decision-making, the risk of management “making all the decisions right by oneself” would be much lowered.
This chapter, as the final one of this research, summarizes the outcomes and presents the conclusion of the research. It discusses whether the research questions have been answered, the limitations of the research and the future research directions.

7.1 Research summary

Lean philosophy is not a new concept, but it is relatively new to be applied to the redesign of service delivery process, especially in a qualitative way. While skeptics are right when they say, “projects are not cars”, the service indeed, as another form of product, delivered in extraordinarily complex organizations, with perhaps hundreds of interacting processes, much like the manufacturing industry. Many lean tools therefore can and do apply to the processes of delivering services. But considering the services are subject to a much greater degree of variability of features than manufacturing, it is a challenge to try to apply the lean tools.

Courageous, forward-thinking company such as the case company is leading the way by demonstrating that the lean management can reduce waste in service industry with results comparable to manufacturing industries. AS mentioned by Giorgio Migliaria, CTIO of Telekom Malaysia: “Our flagship initiative, to deliver outstanding customer service in the most effective manner, was to deploy lean principles in an ambitious program designed to move us toward operational perfection”. (del Pozo, 2012) The management in the case company is willing to be the first one to eat the crab, emphasizes that they are ready and willing to accept lean thinking. Without which, lean will fall in a non-receptive culture.

Often we compare running a business to sailing a ship. The key thing that must be considered is that on either a sailing ship or a business, everyone must know what they are doing, where they are going and what they are supposed to do to get there and that the cargo on board is indeed marketable. Otherwise, you will end up on the rocks somewhere or umpteen fathoms below the water line. (Champy, 1996)

As mentioned by the direct of the business unit, SIGMA is a good tool; as a supplement, the author would also say, LEAN together with the Optimization Focus Matrix is a good tool as well. Since there’s no single silver bullet for solving such a complex problem, we need two and they are not contradictory to each other: the first one is the operational support part while the second one is the general analysis of organizational optimization. Being humble and going into the field to understand the pain points is the best approach.

Even though there are differences between the manufacturing and service industry, this exploratory study established that based both on empirical findings and anecdotal evidence contained in the lean literature, lean philosophy is apparently applicable to the telecom industry within the service sector. The principles of lean are applicable, the structure remains the same, it just need to change certain point of view in the analysis considering the difference of the two
Applying lean philosophy to the redesign of service delivery process

YUE ZHU
IMI

sectors. Anyways, in the case of this research, lean and VSM helps the author to dig deeper and know better the current service delivery state, identify the waste and propose the possible solutions accordingly. The Optimization Focus matrix developed by the author can be used as an assistant tool together with VSM or an independent guideline, leads to actions for continuous improvement.

According to the research conducted together by Stanford University, McKinsey & Company and London School of Economics (2007): Firms across the globe that apply accepted management practices well perform significantly better than those that do not. This suggests that improved management practice is one of the most effective ways for a firm to outperform its peers. This research proved that lean philosophy is also applicable as improved management practice to service delivery process in telecom industry. For the companies within the industry, the applicability is approved. As for the other industries, it still needs to be checked.

Eventually, across many industries, a rising tide of volatility, uncertainty, and business complexity is roiling markets and changing the nature of competition. Mentioned by Doheny et al (2012), companies that can sense, assess, and respond to these pressures faster than rivals will be better at capturing the opportunities and mitigating the downside risks.

7.2 Answer to research questions

The research questions are predefined in chapter 1:

Can lean philosophy be applied to redesign the service delivery process in telecom industry?
What process needs to be followed and what kind of benefit can be drawn for the service provider and stakeholders?

The answer is definitely yes!

To apply the lean philosophy, it is possible to follow the framework (Rohleder & Silver, 1997):

1. Establishing appropriate organizational support;
2. Selecting a process;
3. Assembling a process improvement team;
4. Defining and understanding the process;
5. Streamlining – removal of obvious wastes;
6. Are relevant data available? Yes, go to 7; No, go to 8;
7. Are there identifiable problems? Yes, go to 10; No, go to 8;
8. Monitor process;
9. Is process stable? Yes, go to 11; No, go to 10;
10. Resolution of problems;
11. Does process meet targets? Yes, go to 8 & 2; No, go to 12;
12. Process innovation;
13. Implementation of changes.
Based on the massive data analysis and semi-structured interviews to employees, the author found out the existing "wastes" in the end to end service delivery process, and furthermore the root cause behind this phenomena, and then suggested the applicable solutions based on the lean tool – Value Stream Mapping for improvement. With the suggested future VSM, in the author's proposed future VSM, these actions can save at least 60% of process time, 50% of the process steps and even more can be expected.

As in any huge international corporates existing for quite a long time like the investigated one, there is always space to improve due to the company’s culture and employees’ daily routines. Lean can be applied to all aspects of the supply chain and should be if the maximum benefits within the organization are to be sustainably realized. As mentioned by Melton (2004), the two biggest problems with the application of lean to business processes are the perceived lack of tangible benefits and the view that many business processes are already efficient. Both assumptions can be challenged:

- There are many tangible benefits associated with lean business processes. A lean business process will be faster, e.g. the speed of response to a request for the business process will be faster, and as most business processes are linked to organizational supply chains, then this can deliver significant financial benefits to a company.
- The perception that a business process is already efficient is all too often an illusion. Functionally, many business processes may appear very efficient, however the application of Lean Thinking forces us to review the whole supply chain in which the business process sits, and this frequently reveals bottlenecks and pockets of inefficiency.

This research proved the lean tool not only can be applied to the redesign of end to end service delivery process, but also is able to eliminate wastes and create value for the stakeholders.

7.3 Research limitations

Thanks to the great support of middle management, the author is able to commence the interview and participate in the projects in order to get the first hand information, but there are still some limitations which restricted the research.

- Specificity of the research environment: Due to the organizational limitations, some interviews are not executed as detailed as the author expected, therefore it’s possible that there are still some black boxes exist and some information are missing here in the content. And due to the limitation of the author’s knowledge and experience, there are places to improve throughout the research.

- Lack of practical literature on the research area: One of the major difficulties the author met is receiving different information from different teams regarding the same process, and it is difficult to marshal them on the same basis. Perhaps different people have different opinions about process and therefore conclude dissimilar ideas, but if study from different viewpoint, the conclusion might be varied. Bhatia et al declared that (2006):
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

A lean system is designed to eliminate waste, variability and inflexibility, though given the variety and complexity of many processes there can be no one-size-fits-all lean template. The needs of customers and the organization’s goals and values drive the design.

- High flexibility and variability of the research object: Because of the property of service delivery process, it’s usually difficult to precisely define process time and lead time. They can only be estimated by the operators, so there is a tolerance between the real time and the estimated time. Although the archival data analysis helps as an assist tool to double check the accuracy of the result, but it eventually can’t be to a hair’s breadth as manufacturing process.

- Limited period of research time: Due to the time limitation, the research only focused on the VPN MPLS service provided by the case company, which makes up around 80% of the total customer demand, 70% of the total value and 40% of the workload. In case of many other services provided by the company, the process might vary, and if the process is not standardized, it might be changed in practice from case to case. Besides, the execution of the future value stream map is not able to be seen by the author. As “Making an operation lean is a journey of many years, not a big-bang endeavor” (Staats & Upton, 2011), the author sincerely hope the ideas in this research can be applied in reality successfully and contribute to the case company even in the least extent.

7.4 Future research directions

According to a research conducted by the McKinsey Quarterly, the challenge for managers is to imitate or create good practices and then apply them diligently and with sufficient breadth across all functions. Concretely, that means using lean techniques, setting intelligent goals and targets for employees, and developing and retaining talent. (Dorgan, Dowdy, & Rippin, 2006)

Here are some fields remain interesting for the future research:

- The internal logic among four interventions in the matrix;
- How to ensure the success of lean implementation;
- Investigate into different project types;
- Investigate from different department (higher authorization) point of view;
- Different companies’ comparison, benchmarking;
- Different sector of service industry.
Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM

References


Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM


Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM


Laurens, C., & Van der Molen, O. (2009, winter No.2). This is the time to deliver on upstream operational excellence. *The McKinsey quarterly, 26*-33.


Melton, P. (2004, September). To lean or not to lean? (that is the question). *The Chemical Engineer(759), 34–37*.


Applying lean philosophy to the redesign of service delivery process | YUE ZHU | IMIM


## TIWS IPM Checklist

<table>
<thead>
<tr>
<th>SIGMA IDs</th>
<th>Checker</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mandatory Information</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Dates</strong></td>
<td></td>
</tr>
<tr>
<td>TIWS starting date</td>
<td></td>
</tr>
<tr>
<td>TIWS committed delivery period</td>
<td></td>
</tr>
<tr>
<td>End Customer expected date</td>
<td></td>
</tr>
<tr>
<td><strong>Locations (countries)</strong></td>
<td></td>
</tr>
<tr>
<td>Sites and services per country</td>
<td></td>
</tr>
<tr>
<td><strong>Solution per site</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Subsidiary project?</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Project dependences</td>
<td></td>
</tr>
<tr>
<td>Pilot requirement</td>
<td>Yes, specification</td>
</tr>
<tr>
<td>In case of VoIP/ToIP / Electronica network</td>
<td></td>
</tr>
<tr>
<td><strong>Payment</strong></td>
<td>NRC</td>
</tr>
<tr>
<td><strong>Secondary Information</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Customer</strong></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Contact list</td>
<td></td>
</tr>
<tr>
<td>Governance model</td>
<td></td>
</tr>
<tr>
<td>Historical relationship</td>
<td></td>
</tr>
<tr>
<td>Constrain (special installation hours, special security conditions, local Telespain support, industrial or business facilities...)</td>
<td></td>
</tr>
</tbody>
</table>