

Application of Value Stream Mapping on The Goodyear Aftermarket Customer Satisfaction Process in Europe, Middle East, and Africa (EMEA)

Goodyear Innovation Center Luxembourg (GIC*L)
Colmar-Berg, Luxembourg

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Gothenburg, Sweden 2017

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Abstract

The importance of value streams in organizations is becoming increasingly relevant as the complexity in business grows day by day. Most companies struggle against high levels of variation and dynamics in marketplaces. In addition, different expectations and needs required by the different stakeholders in terms of inputs and outputs in a system create a contradiction with an organization's desire to have a single simple process.

The focus of this case study lies on the identification of gaps within the GOODYEAR warranty claims processing in the EMEA region. Although standard processes have been defined in the past, dynamics in the marketplaces have led to different practices contributing to gaps concerning variations in performance to deliver quality field data to internal customers, and a quick resolution to the external customers' warranty claims. To address these gaps, an exploratory approach to Value Stream Mapping for non-manufacturing environments has been taken.

The outcome of this work suggests a system redesign both to ensure field data to remain fresh and meaningful, and an approach to shorten the lead times from claim entry to resolution. It also entails immediate actions for short-term improvement measures to help to strengthen the roots of a continuous improvement culture in the company.

Value Stream Mapping is a graphical representation of the steps in a process that are needed to fulfill a customer order of products or services. It has its roots in the manufacturing industry where results can easily be seen. During past years, the focus has been on trying to gain the benefits of Value Stream Maps in non-manufacturing environments.

Value Stream Maps are a result of team-work in where people involved in the value stream actively contribute to assess the current state, propose measures for a future state, and contribute to the creation of an implementation plan. Hence, three workshops are required to achieve consensus on specific gaps and the opportunities to pursue.

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Cristian Muñoz G., Luxembourg, June 2017

Preface

This master thesis was conducted during a 20 weeks internship at the GOODYEAR INNOVATION CENTER LUXEMBOURG (GIC*L), from February 2017 until June 2017. It formed part of my five year studies completing the two last years at the master program in Quality and Operations Management. This thesis is made on behalf of the Department for Product and Production Development at Chalmers University of Technology, Gothenburg - Sweden.

I started this project with a firm conviction that I was going to be able to perform a Value Stream Mapping including all the three different stages; Current State, Future State and Implementation Plan. It seemed straightforward, but reality offers complex challenges that go beyond an immediate understanding. I am thankful for that because I learned much more than I ever could imagine.

Definition of Terms

AC	Adjustment Center: Site in which expert analyses of tires are performed.
B2B	Business to Business, <i>AKA B to B</i> , is a type of transaction that exists between businesses, such as one involving a manufacturer and wholesaler, or a wholesaler and a retailer. Business to business refers to business that is conducted between companies, rather than between a company and individual consumers. Business to business stands in contrast to business to consumer, which is denominated as B2C [4].
Benelux	Acronym for the countries Belgium, Netherlands and Luxembourg.
CHP	Claim Handling Process: It addresses a company's accountability to receive, investigate and take action on a claim submitted by a customer. This process involves different administrative and customer service activities to review, adjust and finalize the claim by acceptance or rejection [5].
CI	Continuous Improvement.
Condition	Cause of the warranty claim. The condition is identified by a <i>Condition Code</i> .
Eclaim	Platform to which customers have access to purchase products and/or submit claims. It enables the company to virtually manage and register warranty claims submitted by customers.
EMEA	Acronym for Europe, Middle East and Africa.
ERP	Enterprise Resource Planning: Business process management software that allows an organization to use a system of integrated applications to manage the business and automate many back office functions related to technology, services and human resources [19].
GIC*A	Goodyear Innovation Center Akron.
GIC*L	Goodyear Innovation Center Luxembourg.
GCPP	Government Compliance and Product Performance.
KPI	Key Performance Indicator: A quantifiable measure used to evaluate the success of an organization, employee, etc. in meeting objectives for performance.

TCSM	Technical Customer Service Manager: Might be in charge of customer service operations in a country or in a cluster of countries.
SO	Sales Organization: Organizational unit that sells and distributes products and negotiates terms of sale in a determined country.
VSM	Value Stream Map: Graphical representation of the steps and processes that are needed to deliver a product or service from customer demand to delivery.
TCS	Technical Customer Services: Global organization in charge of customer service.
OEM	Original Equipment Manufacturer - i.e. Volvo, Daimler, BMW, Volkswagen, etc.
PT	Process Time.
PCE	Process Cycle Efficiency.
PD	Product Development.
PDCA	Plan-Do-Check-Act. A four step problem solving methodology.
PP	Product Performance.
R&D	Research and Development.

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1

Introduction

1.1 Goodyear Tire & Rubber Company

GOODYEAR is one of the world's largest tire companies. It employs about 66 000 people and manufactures its products in 48 facilities in 21 countries around the world. Its two global Innovation Centers in Akron, Ohio, and Colmar-Berg - Luxembourg, strive to develop state-of-the-art products and services that set the technology and performance standard for the industry. In addition to the two global innovation centers, GOODYEAR also operates development centers in Hanau - Germany, Hebron, Ohio, and Pulandian - China. Today, GOODYEAR has facilities across the world and annual sales of more than 15 billion dollars. In addition to GOODYEAR-brand tires, the company produces other well-respected international brand names, including Dunlop, Kelly, Fulda, Sava, and Debica, also the non-tire business provides rubber products and polymers for a variety of markets[1][2].

GOODYEAR's operations are divided into three regions around the globe; Americas, Asia Pacific and EMEA (Europe, Middle East, and Africa). GOODYEAR EMEA consists of over 20 000 associates, including more than 50 different nationalities and supplies 32 countries with 16 factories and two R&D Centers in Luxembourg and Hanau. In order to respond to the needs of the European market with its high growth potential, the management of GOODYEAR in Akron decided in 1948 to open a production site on the European continent. Many criteria such as political, economic and social stability, the favorable geographical situation in the heart of Europe, the existing infrastructure, the strength of the currency and the availability of labor, all pointed to Luxembourg as the best choice. The R&D Center referred to as GOODYEAR INNOVATION CENTER LUXEMBOURG (GIC*L) has its main focus on research and development, through the design and testing of new tires for passenger vehicles and heavy goods vehicles for the European, African, Asian and Australian markets. Research is also conducted on raw materials, the profile of tread patterns in contact with the road, the quality of the compounds, etc. [3]

Strategy

GOODYEAR's goal is to deliver sustainable revenue and profitable growth while increasing the value of the brand through - *Innovation Excellence*; developing great products and services that anticipate and respond to the needs of customers, - *Sales & Marketing Excellence*; building the value of the brand, helping customers to win in their markets and become consumers' preferred choice and - *Operational Excellence*; improving quality and efficiency to deliver the right tire, to the right place, at the right time for the right cost.

This will be done by - *Acting with integrity* building trust and earn the confidence of others through honesty and respect to protect GOODYEAR's good name. - *Energizing the team*; by creating an environment where associates are inspired by work, wellness and serving their communities. - *Promoting Collaboration*; by connecting associates globally and encouraging open discussion to meet objectives. - *Being agile*; by embracing change and acting with speed and purpose and - *delivering results* anticipating challenges, seizing opportunities and make courageous decisions.

The focus will lay on *customer service* collaborating with customers to be a great supplier. *Quality* to deliver industry best products, processes and programs. *High-value segments* to compete where GOODYEAR is able to capture the full value of the brand and on *mastering complexity* by managing the necessary and eliminating the unneeded.

1.2 Lean at Goodyear Tire & Rubber Company

GOODYEAR is one of the few companies that has been successful in implementing Lean not only at the production plants but also in R&D processes. The implementation of Lean in a non-manufacturing process is never easy since much of the efforts and results are not visible in the short-term horizon. Lean in manufacturing focuses mainly on eliminating waste and variability, while in R&D, the complexity levels are much higher since waste and variability might not always be counterproductive. Lean initiatives at GOODYEAR can be traced back to 2003 as manufacturing and supply chain tried the implementation of this philosophy in one or two projects. The first major Lean program started in 2005 to define and understand the value stream within the organization. The function starting with this major deployment was product development. For the great majority of companies, R&D is not the first choice to start with Lean but rather within manufacturing. Ahead of this initiative was Norbert Majerus who managed to implement the Lean principles at the global innovations centers in Akron, Ohio, Colmar-Berg in Luxembourg and Hanau in Germany [6]. This journey towards Lean Product Development was described in his book *LEAN-DRIVEN INNOVATION - POWERING PRODUCT DEVELOPMENT AT THE GOODYEAR TIRE & RUBBER COMPANY* [6] which caught the attention of the world's most prominent Lean practitioners leading to the internationally recognized award from the Shingo Institute [26].

1.3 Government Compliance & Product Performance (GCPP)

The GCPP at GOODYEAR is a global team located and acting in GIC*L, GIC*A, and other development centers. GCPP is responsible for ensuring customer satisfaction through professionally managed analysis of product field performance and for understanding government and industry standards, coordinate compliance, among others. The claimed conditions of the tires provide valuable information to product analysts about the performance of GOODYEAR products on the local market. Product performance of tires in the field is evaluated based on feedback on warranty claim data among others. The quality of the information collected throughout the claim treatment process is key to trigger appropriate actions.

Customer claims are assessed through the Claim Handling Process (CHP) that extends from the moment the customer submits a complaint, until the final resolution of the case. Since the EMEA region covers a significant number of countries, several factors can contribute to the variation of the CHP, such as culture, local regulations, local markets, and practices. Quality of the data and the prompt response to customer demands are essential to both delivering high-quality products and ensure customer satisfaction. GCPP operates with Technical Customer Service Managers (TCSMs) and Adjustment Centers throughout the EMEA region.

1.4 Background

GIC*L is the headquarters for the operations of the aftermarket processes in the EMEA region. Within the region, there are different clusters defined according to the size and characteristics of the marketplaces. The countries or clusters are identified by their own sales organization (SO) number. The customer service operations in the Nordic countries, Estonia and Lithuania are managed from the headquarters in Norrköping, Sweden. Similarly, for the Benelux region, the operations are managed both from the Netherlands and Belgium. Germany, Poland, and Italy are considerably bigger markets, hence they constitute a single SO, respectively. The countries depicted in figure 1.1 represent those which are included in the study. For the value stream mapping workshops, one of these were selected and will be referred to as Country A. This portion of the operations in the EMEA region gives an idea about the complexity levels created by the difference in cultures, markets and customer expectations.

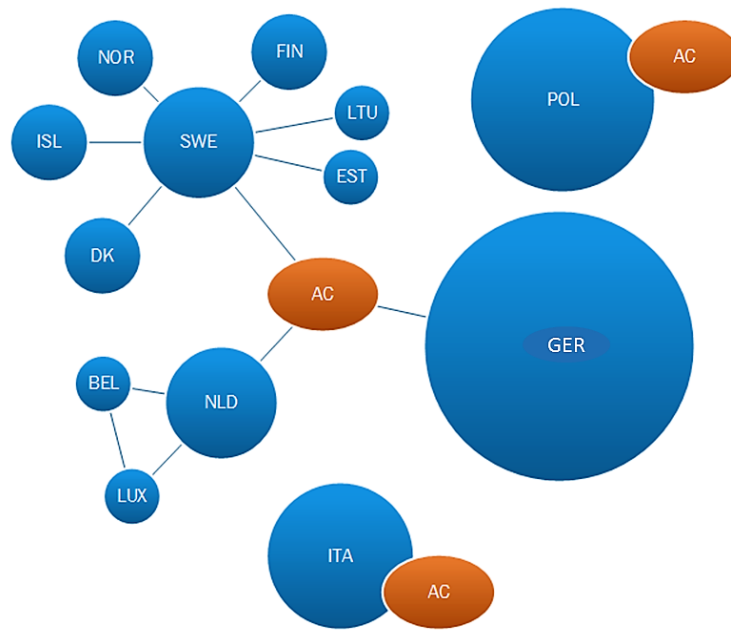


Figure 1.1: Countries/Sales Organizations included in the study

The tire market is very dynamic. New competitors are on the rise as existing ones are constantly presenting challenges to surpass. Similarly, customers changing demand impose great challenges to how the company meets customers' expectation. It is impossible to define the customer as a homogeneous group. "There are so many different customers and we usually have different relations to them. We have tire dealers, car dealers, wholesalers, etc. and all of them have different requirements in terms of internal processes such as billing and so on, [...] therefore we need to handle every case very carefully and accurately" - Hinnerk Spiegel [42], TCSM Germany. Hence, being agile to adapt to this dynamic market is key to remain as customers' first choice.

The GOODYEAR business in EMEA is defined as B2B (Business to Business), with the exception of particular business units such as OEMs and servitized business models in where fleet owners play the role as both customer and consumers. It is therefore critical to make a clear definition of the customer for this study. Customers to GOODYEAR will be hereafter referred as *External Customers* invoking tire dealers and categorically excluding the consumer. Even if the definition of customer is clear, the relationship customer/GOODYEAR is not always as clear as expected.

1.5 Problem Definition

While a standard process to handle customer satisfaction across EMEA region has been defined in the past, the current challenge is to ensure full compatibility with local regulations and the evolving nature of the operation including specifications of local business needs, as well as capabilities constraints. This has led to different practices as a result of local markets conditions among others. One of the most important effects of this is the levels of quality of information that is provided by customers. The purpose of this information is twofold; to correctly assess the condition of the tire and to perform analyses to contribute to further development of products. On the other hand, there is a need to make the different processes visible to the headquarters in Luxembourg in order to assess the evolution of the claim handling process in the different countries. Gaining full visibility of the differences and similarities among processes will help to assess the current state to take action on the required areas of improvement.

Today, failed complaint-handling experiences from customers result in reduced brand loyalty [14]. For this reason, it is key to assess the warranty process from the value stream perspective to ensure external and internal customer focus.

1.6 Purpose of the Study

The aim of this project is to help bring clarity on how the warranty claim handling process is managed throughout the different countries comprising the EMEA region. This requires analysis of both the data information flow and the tire flow. The findings are documented to be used by a large group of GOODYEAR associates.

The project is based on the identification of gaps in the current process in order to propose an idealized version in combination with the definition of action plans to address the gaps. It forms also part of the purpose to contribute to the Lean culture at GOODYEAR by adapting the Lean principles to the aftermarket processes and thus, contributing to a common ground of communication across functions.

The work described in this report comprises solely the value stream mapping workshops performed in country A. Parallel to this activity, interviews were made which

gave enough information to represent the processes in different value stream maps that are material for internal assessment at the company. In this way, the differences and similarities can be represented in value stream terms.

1.7 Importance of the Study

As stated before, the result of this study will serve as a baseline for rethinking the strategy to meet customers' expectations. It will also contribute to the Lean efforts that GOODYEAR has made during the last several years. In addition, there is still a low number of published cases on Value streams maps for non-manufacturing environments and this work is an attempt to contribute with experiences by exploring this area.

1.8 Research Questions

The aftermarket activities, including the CHP, provide vital information on the performance of products, and since distributors and sales are in the front line of customer contact, they also play a very important role not only in the levels of customer satisfaction but also in the quality of data forwarded to product analysts. Although there is a standard procedure to handle the CHP, there are still factors that serve as a barrier for the process agility. Therefore, it is necessary to first understand the different practices and the reasons behind those. Hence, the first research question is;

RQ1: How is the CHP carried out in the different studied countries?

- How have the standard procedures changed over time due to local market circumstances?
- What are the communication channels?
- How is the interaction between Consumer-Customer, Customer-TCSM, TCSM-AC?
- Which are the criteria used to enter the data describing the condition?
- In which way do the different players influence the CHP?

Key Performance Indicators (KPIs) are directly related to the levels of customer satisfaction. Although there exist tools for statistical analysis available to provide an overview of performance, TCSMs, ACs, and customers across the region are accountable for their own internal process performance and lead times.

RQ2: What are the KPIs used in each site to measure performance?

- How is performance measured?

- Are the shipping distances of tires to the adjustment center affecting lead time? why?
- What are the factors influencing the variation of the lead time?
- To what extent is it realistic to shorten this lead time?

Since the main objective of the project is to streamline the CHP, it is necessary to first define value in order to identify sources of waste at each site. After getting a better understanding of the process, it will be possible to assess and identify possible causes to the interference of the process.

RQ3: What are the current value and non value-added activities at each site?

Once the problems are visible and identified, it is essential to propose an action plan based on the information gathered during the interviews and workshops and the ideal future state aimed to eliminate waste in the process.

RQ4: What is the most appropriate action plan to streamline the CHP throughout the EMEA region? What, How, Who, Where, When.

1.9 Scope of the Study

Since the time frame to finalize this work is 20 weeks, the scope of the investigation will be narrowed to cover: Benelux, Germany, Italy, Nordic Countries and Poland.

Product Family

To ensure a successful result for the Value Stream Mapping, it is imperative to clearly define the product family to be investigated. The following product families are subjected to the same process for claims handling:

- **Commercial Tires:** On the road, heavy and medium duty vehicles and,
- **Consumer Tires:** Light duty and passenger vehicles.

Due to the similarity in how claims of the mentioned product families are processed, they will form part of this investigation.

1.10 Limitations

Warranty claims processes that will not form part of the investigation are:

- Commercial and consumer tires for Original Equipment Manufacturer (OEM)
- OTR (Off-The-Road) tires and Motor Sport
- Warranty claims that are expressed through social media and forums

2

Literature Review

While most of the literature related to Value Stream Maps teaches us that it is a tool originated within Toyota as Material and Information Flow Diagrams (MIFD), there are others that firmly doubt this affirmation. Michael Baudin made an investigation [10] to trace the origins of VSMs in several books about the Toyota Production System (TPS) without finding anything similar to what we know as VSMs. In order to get to the bottom of this enigma, Baudin asked members of the *TPS Principles and Practice* discussion forum on LinkedIn. Several experts replied to his question about the origins of VSM. One Toyota alumnus explained that Materials and Information Flow Diagrams have been developed by the Toyota's Operations Management Consulting Division (OMCD) and that the technique was introduced in the US by the Toyota Supplier Support Center (TSSC). Further, the alumnus explains that inside Toyota, it is very rare to see any MIFDs. This affirmation is also supported by Art Smalley in the article *TPS Versus Lean and the Law of Unintended Consequences* [15]:

"But there were no value stream maps in the Toyota facility in West Virginia, nor are there value stream managers. And this is hardly because Toyota employees are so smart they all carry the value stream maps around in their heads. The reason there are no value stream maps in most Toyota plants is very simple in hindsight. It was a tool developed primarily as an analytical aid to look at material and information flow problems in certain processes. In fact, the actual name of the tool at Toyota is "material and information flow analysis" - not value stream mapping." - Art Smalley

The investigation made by Baudin led him to find examples of MIFDs as early as 1917 in a book by the name of *INSTALLING EFFICIENCY METHODS* by Charles E. Knoeppel [16].

The term Value Stream Map was coined by Mike Rother & John Shook in their book *LEARNING TO SEE* [11], published in 1998. The methodology spread by leaps and bounds among lean practitioners in the western hemisphere. The publication of this book was a breakthrough within the manufacturing industry as the authors explained in a very detailed way the steps that are required to eliminate wasteful activities from the manufacturing process and to redesign them by creating a future ideal state. For many years, VSMs were mainly related to manufacturing processes.

The first publication addressing value stream for non-manufacturing processes came in 2003 by the hand of Don Tapping & Tom Shuker with the book *VALUE STREAM MANAGEMENT FOR THE LEAN OFFICE: Eight Steps to Planning, Mapping, Sustaining Lean Improvements in Administrative Areas* [38]. This publication was followed in 2004 by *THE COMPLETE LEAN ENTERPRISE: Value Stream Mapping for Administrative and Office Processes* [31]. These books cover VSM in processes mainly related to an office environment in relation to manufacturing. But, there was still a need for a comprehensive book addressing VSMs in the different non-manufacturing environments. In 2015, Martin & Osterling managed to bring together the available knowledge on Value Stream Maps into a book that closed the gap to adapt VSMs to a great variety of non-manufacturing environments. The step-by step approach described in their book *VALUE STREAM MAPPING: How to Visualize Work and Align Leadership for Organizational Transformation* will serve as the baseline to plan and perform the Value Stream Mapping workshops in this project.

For this work it is key to clearly distinguish the difference between process improvement and value stream improvement. While value stream improvements focus on the flow between processes, process improvements focus on the variation within the processes [8]. It is exactly this difference which determines whether the improvement efforts will be beneficiary for the flow or it will only result in a suboptimization within the system. Further, there is still one more dimension that exists within this hierarchical structure, tasks. In task improvements, the focus lies on the standardization of how the work is performed. Suboptimizations can create more damage than benefits for the overall system making it perform poorly.

"Anything less than optimization of the whole system will bring eventual loss to every component in the system. Any group should have as its aim optimization of the larger system that the group operates in. The obligation of any component is not to contribute its best to the system, not to maximize its own production, profit, or sales, nor other competitive measure. Some components might operate at a loss themselves in order to optimize the whole system, including the components that take a loss" [28].

It is known that people in functions often do not understand which influence they have in the system, therefore it is beneficial to the whole company when local improvement efforts are focused on the whole value stream rather than on their own objectives. In order to be able to apply lean so that it achieves its full potential, everyone playing a role in the system should understand the basics of the lean principles [6].

Value Stream Mapping offers the opportunity for organizations to get a holistic view on processes having focus on how the work flows throughout functions and systems. They differ from flow charts in the following way:

- Form a foundation for the creation of strategic improvements
- Provide a full-cycle view of end-to-end work progress
- Deepen organizational understanding about value delivered to customers
- Provide quantitative grounds for decision making through enabling operations to meet both customers' and stakeholders' expectations
- Deviate organizational focus on internal process-level towards how customers' experience. "Many organizations are structured as a series of function-based silos that bear little relationship to the customer fulfillment cycle" [34].

3

Theoretical Framework

Lean focuses on the elimination of wastes that stand in the way for companies to create high-value processes, services, and products to its customers. In order to achieve this, Lean organizations focus on the entire flow of services throughout the entire end-to-end value stream rather than focus on the optimization of segmented processes. Directing focus on the whole value stream and eliminating waste will create processes that are able to respond to changing customer requirements and demands with high quality, low costs, and agility. In addition, by eliminating chronic waste (wasteful activities that become invisible over time), managing the information flow becomes much easier as the quality of information increases. Eliminating waste along entire value streams, instead of at isolated points, creates processes that need less human effort, less space, less capital, and less time to make products and services at far less costs and with much fewer defects, compared with traditional business systems. Companies are able to respond to changing customer desires with high variety, high quality, low cost, and with very fast throughput times. In addition, information management becomes much simpler and accurate [18].

Nigel & Slack [22] make a comprehensive comparison between Lean and a conventional approach to operations. The conventional approach assumes that each function in the process will be independent of the function downstream. In case of a function experiencing stop in production, the rest will be able to independently continue operating, at least for a period of time. The bigger the buffer, the more isolated and independent the function becomes, see figure 3.1. The major criticism of the conventional approach is based on the argument that if a problem arises in one of the functions, it will not be detected until it starts affecting the whole system. Hence, the responsibility for solving a problem lies exclusively on the people operating in the function.

3. Theoretical Framework

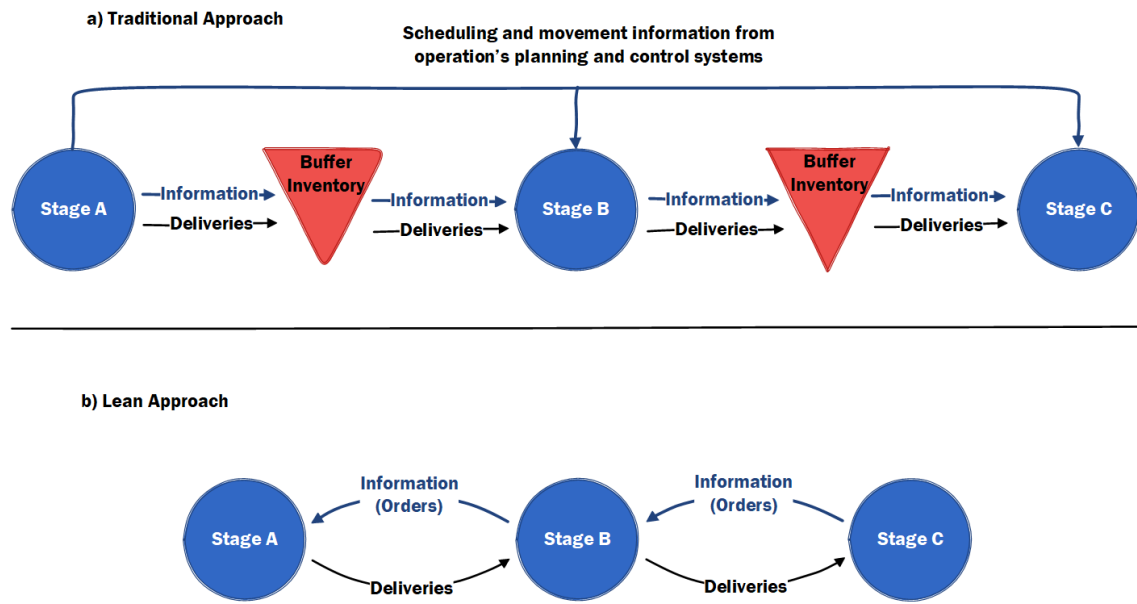


Figure 3.1: Traditional vs. Lean approach to operations [22].

On the contrary, the Lean approach allows functions to be interdependent meaning that every problem will quickly become visible and as a consequence, the responsibility for solving it will be shared among the functions. Shared responsibility will increase the probability of the problem to be solved more quickly. Similarly, by preventing buffers of items between functions, the system will become more efficient and agile [22].

3.1 Conceptual Framework

3.1.1 Getting traction with The Goodyear Improvement Wheel

There are still misconceptions about the purpose of the VSM. One of the most common belief is that having a VSM is the goal to gain an understanding of the different value streams in processes, but the real purpose of it lies in the persevering desire for pursuing improvements in the system. To give the VSM the purpose that it deserves, it is imperative to place this tool in a greater cycle.

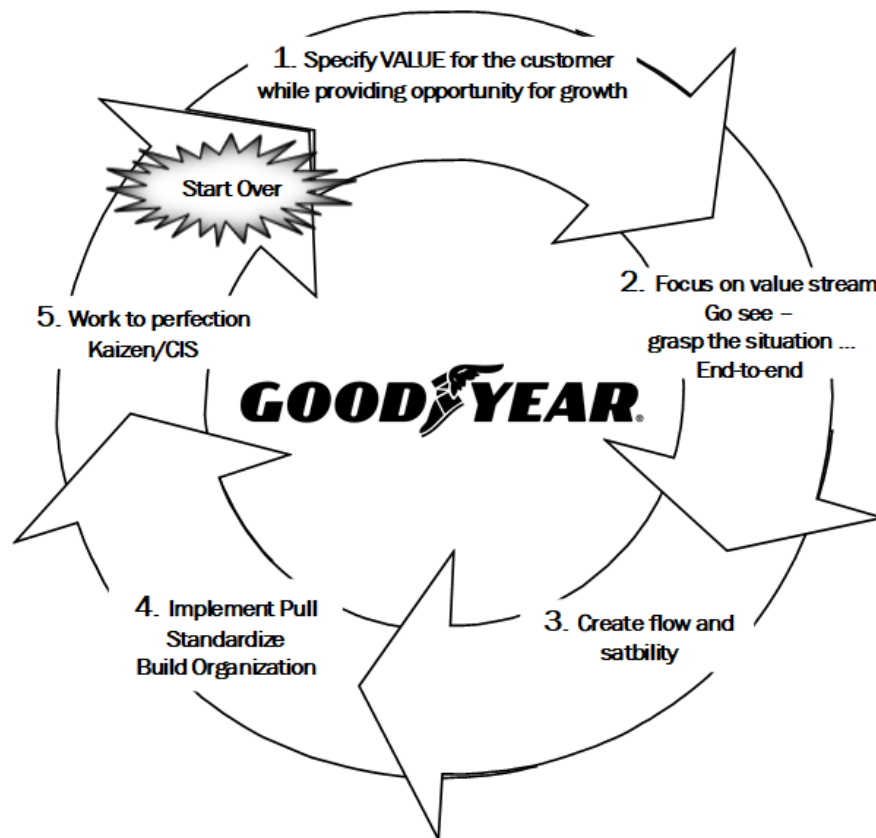


Figure 3.2: THE GOODYEAR IMPROVEMENT WHEEL by Norbert Majerus [6].

During the early attempts to implement Lean at GOODYEAR, Majerus [6] found that THE GOODYEAR IMPROVEMENT WHEEL was a very good road map to any Lean initiative. Majerus adapted the Five Lean Principles originally presented by Womack & Jones into an endless cycle similar to the PDCA, see figure 3.2. This approach to improvement at GOODYEAR started in 2005, and it has ever since been the foundation for every initiated improvement effort. The steps are:

1. **Specify value.** The first step consists in the definition of customer value. During this step, it is key to address both external and internal customers' need in order to deliver the best to external customers through gaining consistency among the internal customers involved in the process.

2. **Focus on the value stream.** Look at the end-to-end value stream to understand stakeholders' and other players' roles in terms of value contribution to the process. To grasp the situation, it is necessary to Go and See (Gemba walks). The most suitable Lean tool to approach this step is through the VSM.
3. **Create flow.** According to Majerus, this is one of the most difficult steps in the GOODYEAR IMPROVEMENT WHEEL.

“Designing a new process in mind is much easier than creating flow in an existing process”

4. **Implement pull.** One of the most critical steps for redesigning a process. Majerus highlights the importance of everyone involved to understand the basics of the Lean philosophy so that to fully understand what a pull system means and how they contribute to a system that delivers what is needed, when it is needed, in the needed amount and at the right time. Once this is done, it is time to standardize the process and define the organization that will be standing behind to ensure and sustain the change.
5. **Work to perfection.** The “F5 key” of the cycle. Work to perfection is a never-ending endeavor for continuous improvement. It is also needed to define what is meant with perfection. Many argue on whether “Excellence” is a better word instead of “Perfection”. Perfection is a state of mind that will allow us to achieve excellence.

“But you do not have to be perfect, you only need to remain better than your competitors today and those that will emerge tomorrow” – Norbert Majerus

3.1.2 Value Stream Mapping

Although Lean concepts are typically linked to manufacturing processes, they are indeed applicable in non-manufacturing environments. The difference is that plenty of creativity is required to make well use of them and gain meaningful benefits. VSMs provide clarity to an organization about processes from the customers' point of view [31]. It is important to understand that every VSM might look very different depending on the environment that it is representing. It is a storyboard about how the work flows through the value stream.

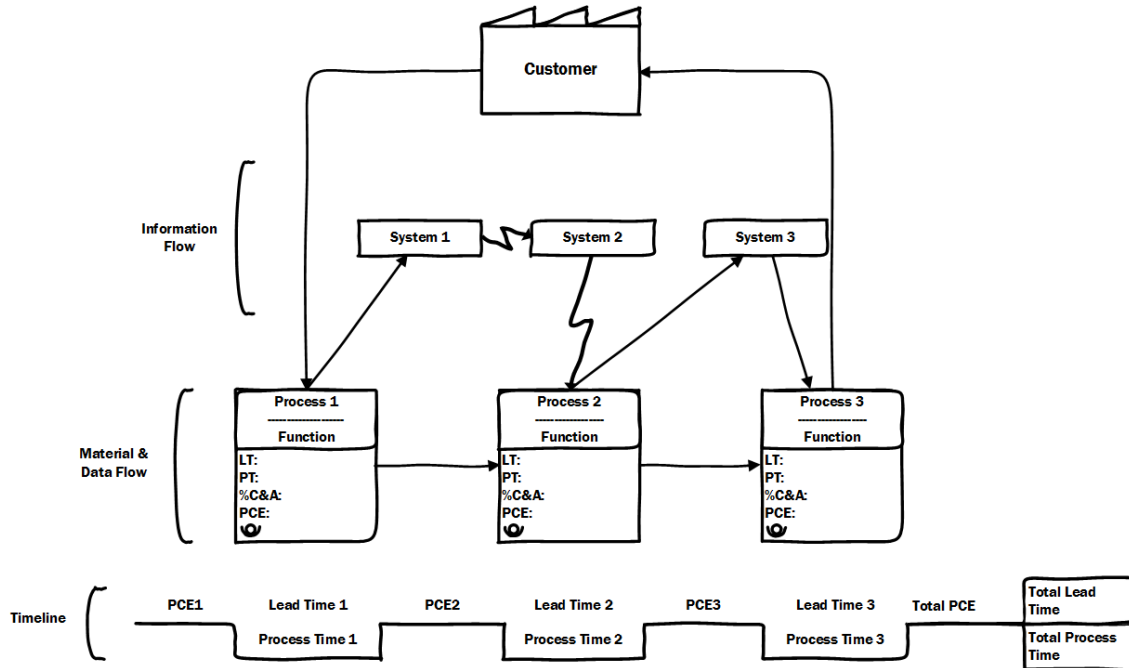


Figure 3.3: Basic Value Stream Map Structure.

Figure 3.3 depicts the basic structure of a Value Stream Map for non-manufacturing environments. Unlike traditional VSMs, the customer is placed in the center, and it is the customer who triggers the process by submitting a request.

The **information flow** describes how the information is transmitted through different systems from one process to another. It might be emails, fax, ERP (Enterprise Resource Planning) systems, etc. At the network of process level, it is possible to visualize the sequence of **material and data flow** across functions, this will give information about how many functions are involved in the value stream, while the **timeline** will tell us about their performance.

3.1.2.1 Benefits of Value Stream Maps

Organizations can benefit from implementing VSMs as they [34]:

1. Contribute to a high-level view of the workflow throughout the whole value stream to allow for decision making and prioritization of improvement areas. It allows organizations to think in system terms rather than focusing on specific functions. One of the most common mistakes made by organizations is to implement improvements without considering the entire value stream. This leads to sub-optimized functions that can create more harm than benefits. By thinking in terms of systems, it will allow organizations to align functions pointing towards the same direction to ensure optimal value stream performance.
2. Bring clarity to the truth of the current process to allow the organization to make strategic decisions based on facts. Much of the elements that constitute a value stream in a non-manufacturing environment are not tangible; such as information and data flow. Value stream maps make the invisible visible and bring clarity on who is doing what, how long it takes, who is receiving/delivering what, how it is received/delivered and how we contribute to the value stream. One interesting thing that many organizations discover as they get visibility is that often problems extend outside the function in which the problem has been addressed to. Hence, to efficiently solve a problem, it is necessary to solve it with the help of a cross-functional group of people.
3. Help to achieve consensus across functions. This benefit is considered as the most important by Karen Martin since it allows leadership to understand what is needed and where it is needed.
4. [...] are metric based. Flowcharts provide a good level of understanding in terms of sequential actions in a process, but they become useless once it is time to make improvement decisions. Along with the flowchart benefits, VSMs provide metrics to understand performance both at process and value stream level. It challenges organizations to take action to change the numbers to improve the process.
5. Help to set a strategy before diving into tactics: To avoid sub-optimization, keep the focus on the value stream and create a foundation to continue with the steps in the GOODYEAR IMPROVEMENT WHEEL. It also allows the visualization of opportunities for improvement without "going into the weeds" and get blinded by an infinity of micro-level details. Figure 3.4 represents the role of the Value Stream Map in the decision-making hierarchy moving from the strategic to the tactical level of decision-making [34].

"Processes should be improved or optimized on the highest level, so that all subprocesses can take advantage of the improvement. If at all possible, this should be done globally. Standards should be set on the same level, so best practices are shared and implemented everywhere in the most efficient manner" - Norbert Majerus

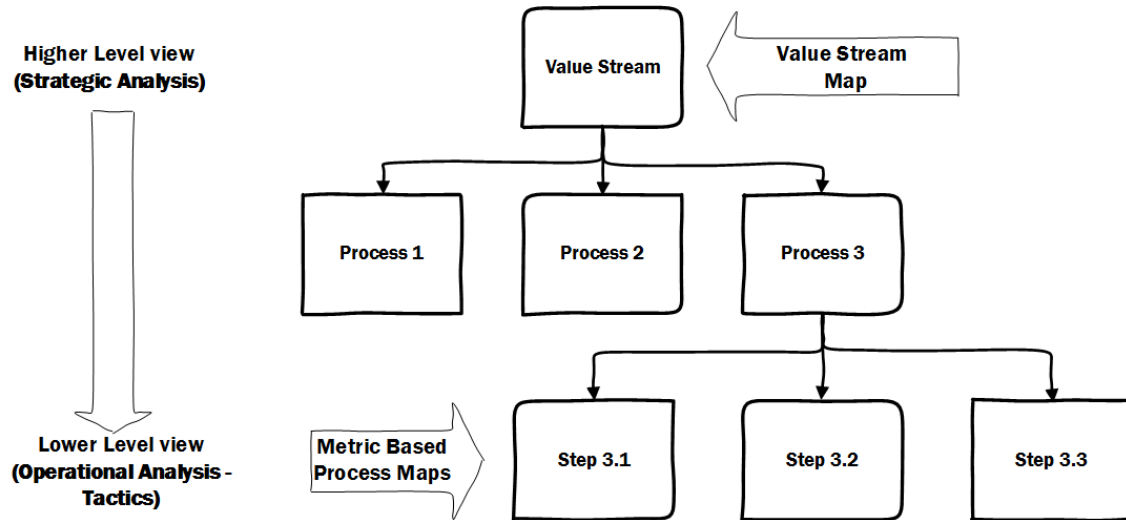


Figure 3.4: Levels of decision making. VSM belongs to Strategic Level [34].

Slack & Lewis [22] refer to the three levels as *"hierarchy of operations"* where the upper level is denominated as *Level of Supply Network* (network of operations) in which it is required the knowledge of the "capabilities of the network and the relationship between them". The middle level is called *Level of Operations* (network of processes) which requires knowledge of "the capabilities of each process in the operation and the relationship between them". Finally, the *Level of the Process* (a network of individual units of resources). This level requires knowledge about the "capabilities in each unit of resource in the process and the relationship between them" [22]. In summary, Value Stream Maps bring clarity on how the network of operations relates to each other in the value stream.

3.1.2.2 Value Stream Mapping Charter

The value stream Mapping charter described by Karen Martin [34] provides a specific plan to perform the mapping activities. It is considered as a key component for upfront planning which will determine the degree of success of the VSM. The purpose of the charter is fourfold; planning, communicating, aligning, and building consensus. Its content describes:

Scope

A clearly defined scope helps the team to focus on the subject of discussion rather than spending time agreeing in what to focus on. The scope description requires the following components:

- **Value Stream:** Specifies the value stream to be mapped - In this case, end-to-end customer experience.
- **Specific Conditions:** Non-manufacturing processes often present a big variety of micro-level details. Specific conditions are aimed to decrease the complexity by determining the steps in the processes that will be studied during the mapping activities. They will help the team to focus on work flow rather than discussing whether certain details should be taken into consideration or not. The specific conditions are directly related to the product families that share the same processes throughout the value stream. Hence, as the processes to be studied are in forehand agreed by the team, it will help to gain meaningful results to assess the current state.
- **Demand Rate:** This is the starting point for gaining an understanding of the current state performance to design a pull system. It also tells us about how the work flows in accordance to the amount of incoming work.
- **Trigger:** The action that initiates the process. In our case, the claim entry on Eclaim.
- **First Step & Last Step:** What initiates and finalizes the work flow through the value stream.
- **Boundaries & Limitations:** Specifies the limits of the playground. What can and cannot be changed for the future state. It could be related to organizational aspects, policies, market, systems etc.
- **Improvement Time Frame:** Karen Martin [34] recommends to specify a time frame for the improvement measure; it could be three to six months since longer time frames could affect the improvement effort due to changes in leadership priorities, market, regulations, etc. In some cases it is necessary to wait to define the time frame according to the magnitude of the improvements required to allow the organization to prepare and absorb change.

Current State Problems & Business Needs

To achieve consensus on the problems that the organization is currently facing and the reasons why a solution is needed; It is necessary to choose two to five problems and business needs to improve throughout the whole value stream [34].

Measurable Target Condition

The targets reflect the levels of ambition for the improvements to be made i.e. "Improve Lead Time from a current state X to a future state Y, with Z% improvement".

Benefits to Customers & Business

Accomplishing consensus on the benefits to both customers and business will create a base to avoid or reduce resistance and find a fast-track for the execution of improvement measures. This section allows to highlight benefits that are difficult to measure but create focus towards future benefits.

Accountable Parties

The most important aspect of every improvement effort is top management support along with the right team with defined roles and responsibilities for the participants during the workshops. The accountable parties include: Executive sponsor, Value Stream Champion, Facilitator and logistic coordinator.

Mapping Team

Includes the list of participants representing different functions in order to get a deep understanding of the end-to-end value stream.

Other sections included in the charter are On-Call Support referring to other people within the company who play a key role in the value stream. The document concludes with an agreement showing commitment to the findings on the value stream mapping sessions and to support change.

A sample of the VSM charter used for this case is depicted in Appendix A1.

3.1.3 Lean Concepts

3.1.3.1 Value

Value in a value stream is defined as all the activities, both value-added and non value-added that are required to bring a product or service from request to delivery. The Lean philosophy strives for strengthening the family of value-added activities while eradicating those that are not contributing to enhancing the customers' perception of the process. The *Value-Added* activities of a process disembody into a set of properties in a product or service for which the customer will be willing to pay. This also known as perceived customer value. On the other hand, what customers do not perceive as value is categorized as *Non Value-Added* activities. These are classified into two groups; *Necessary Non Value-Added* are those activities that are necessary to support the operations in the system in such way as if they would not be performed, value delivery would be made impossible. *Unnecessary Non value-added* activities are considered as pure waste. See section 3.1.3.4.

3.1.3.2 Value Stream

Trapping and Shuker [38] describe the value stream as a flowing river without any sharp ends where the work units flow as smoothly as possible and with a minimum effort towards the customer. Karen Martin [34] describes it as a sequence of activities aimed to deliver a goods or services to a customer flowing through a series of functional departments. The Lean Lexicon [39] defines Value Stream as "All of the actions, both value creating and non-value creating, required to bring a product from concept to launch (also known as *development value stream*) and from order to delivery (also known as *operational value stream*). These include actions to process information from the customer and actions to transform the product on its way to the customer."

Although these descriptions point in the same direction, Value Stream in this study can be synthesized into a mixture of the three of them. "A smooth-flowing river of both value-added and non value-added activities required to bring a service from order to delivery". The notion of *flow* in this value stream definition can refer to an idealized state of Value Stream. In most companies, value streams often present sharp ends that can only be revealed once they are visualized on a map.

3.1.3.3 Just in Time

Just in Time (JIT) refers to a system or process delivering "*what is needed, just when it is needed, and just in the amount needed.*". It relies on Heijunka [27] to level production over time avoiding batches of inventory. Similarly, Heijunka relies on the main components *pull system, takt time, and continuous flow*.

Pull System

The downstream process retrieves only what is needed for performing the activity to contribute to the value stream minimizing waiting time, inventory, and overproduction.

Takt Time

German and Swedish for 'rhythm' or 'beat'. Customer demand sets the pace at which the value stream should operate. This is a metric that is calculated by assessing the available daily effective working hours and the daily customer demand (number of claims):

$$\text{Takt time} = \frac{\text{Effective working hours}}{\text{Number of warranty claims}} \quad (3.1)$$

Although it is an important metric to assess the efficiency of personnel vs. the work in process, it will not form part of the investigation as the intent is to investigate the causes affecting data quality and to find room for improvement to shorten the lead time. On the other hand, daily customer demand will be key to assess the efficiency of the current state.

Continuous Flow

To process one or a small consistent batch of items requiring only the necessary amount of effort. It is described as "the ultimate objective of Lean production". Continuous flow encompasses flow of information, material and work [23].

Kanban

Kanban is a production control strategy for just-in-time production developed by the Vice-President of Toyota Motors Company, Mr. Taichi Ohno [24]. Its main objective is to optimize inventory levels at each process of the value stream by the utilization of cards that provide information about the amount of work required at each stage. All this with the aim of replacing traditional techniques that create overstock of items, such as push-type systems [25]. *Kanban* means "tag" or "ticket" for [26]:

1. Production command: what, how much, where and when to produce
2. The number of items according to the number of Kanbans
3. Abridging production instructions to enable flexible response to changes in demand

JIT aims for the total elimination of all waste to achieve the best possible quality, lowest possible cost and use of resources, and the shortest possible production and delivery lead times. Although simple in principle, JIT demands discipline for effective implementation [27]. A JIT process representation is depicted in figure 3.1.b.

3.1.3.4 Waste

Womack and Jones [11] refer to non value-added activities as waste. Although the activities referred in the original definition of waste are manufacturing related, it was found that waste is present in all kind of environments [34]. Therefore, as in manufacturing we classify waste as follows:

Transportation:	Transportation of items that results in additional unnecessary costs and effort.
Inventory:	Excessive storage of items or information.
Motion:	Unnecessary movement i.e. looking for information/documents.
Waiting:	Customer waiting for a resolution, jobs waiting for resources to start their transformation.
Overproduction:	Processing "just in case" or more than is required.
Overprocessing:	Excessive work for delivering a result, redundant activities.
Defects:	Inaccurate information or data entry.
Skills:	Employees confront barriers to develop to their full potential; limited authority to impact their work & lack of responsibility.

3.1.4 Continuous Improvement

Bhuiyan and Baghel [20] identified three different levels at which continuous improvement can take place. Firstly, at the *management level* where focus is on the organizational strategy. Secondly, at the *group level* continuous improvement (CI) comprises the development of problem-solving skills at a broad level and lastly, at the *individual level* where micro scale improvement of day-to-day tasks are performed. Management should be able to apply CI programs throughout this three levels to foster a culture continuous improvement.

"Continuous improvement is the rigorous and joyful identification and elimination of wastes in the value stream. A prerequisite is a culture in which non value-added tasks are courageously called waste" - Jeff Mathews [43]

3.1.4.1 A3

The A3 got its name after the paper size format. It allows the telling of a compelling story about a problem or situation for improvement and provides strong root-cause emphasis making it possible to assess problems qualitatively and analytically. The focus lies on improvements related to quality, costs, delivery, safety, etc. It develops problem solvers through coaching and by keeping alignment and agreement within the organization [12].

The A3 Problem-solving tool can be compared to a simplified version of the PDCA since all the contents should fit on one A3 piece of paper. The following list shows how A3 Problem-solving and PDCA relate to each other [17]:

1. Define the problem relative to the ideal (PLAN)

2. Break down the problem into manageable pieces (PLAN)
3. Identify the root cause (PLAN)
4. Set target for improvement (PLAN)
5. Select the appropriate solution among several alternatives (PLAN)
6. Implement the solution (DO)
7. Check impact (CHECK)
8. Adjust, Standardize, and Spread (ACT)

3.2 Research Strategy & Research Design

The research strategy for this thesis contains all characteristics of an action research. Those are [37]:

- Experimenting on a real problem within an organization, involving an iterative process for identifying a problem leading to an evaluation for action
- Leading to paradigm change by identifying new courses of action
- Contributing to both academic theory and practical action

The technique for organizing and conducting this work reflects what is known as a case study. Many of the existing theory on research recommend the following six steps to frame the process of the investigation:

1. Determine and define the research questions
2. Select case and determine data gathering and analysis techniques
3. Prepare and collect data (Interviews)
4. Collect data in the field (Gemba walks and VSM)
5. Evaluate and analyze data
6. Prepare report

3.3 Participants

In order to get more accurate data and a better overview of the process, it was necessary to include participants that are representative for every function involved in the process. The persons involved in the investigation are:

3.3.1 One-on-One Interviews

- Product Analysts and Field Engineers at Product Performance in GIC*L
- Technical Customer Service Managers from the Nordic countries, Benelux, Germany, Poland and Italy
- Sales representatives for commercial and consumer respectively
- Adjustment Center Managers
- EMEA Technical Customer Service Manager

3.3.2 VSM workshops in Country A

- Technical Customer Service Managers
- Sales Representative for consumer products
- Logistic Partner representative
- Jeff Mathews, R&D Lean Operations (Facilitator)
- Cristian Muñoz (Facilitator/Organizer)

3.4 Ethical Considerations

Ethical considerations will be taken as a high priority while performing interviews in order to ensure credibility and accuracy of results. These considerations will be based upon the FOUR ETHICAL PRINCIPLES by Diener & Crandall [33]. They are:

1. **Harm**

Ensure that respondents are in no way directly harmed or adversely affected.

2. **Lack of informed consent**

Be given as much information as might be needed to make an informed decision about whether or not to participate in a study.

3. **Invasion of privacy**

Not to intrude on a respondent's privacy nor abandon normal respect for individual's value.

4. **Deception**

Not represent the research as something other than what it is.

4

Methods

The methodology to approach the workshops was based on the step-by-step description on Value Stream Mapping for non-manufacturing environments by Karen Martin in her book *VALUE STREAM MAPPING - HOW TO VISUALIZE WORK AND ALIGN LEADERSHIP FOR ORGANIZATIONAL TRANSFORMATION* [34].

4.1 Specify Value for Customers

Here we will refer to B2B partners as *External Customers* and functions within the company as *Internal Customers*.

External Customer

As a warranty claim occurs, different levels of customer dissatisfaction are involved. Hence, the nature of the process towards the customer is purely based on how those levels of dissatisfaction are managed in accordance with the definition of expected value to be delivered. A research carried out at MIT [14] found that not only customer behavior has changed during the last few years following the trend of evolution in technologies, but also the expectations in resolutions of claims. The research also shows that the expected customer value are:

- To obtain a fast and effective response to practical problems
- To be treated with dignity, and
- To be able to interact with a company representative who emphatically takes ownership of the problem

Internal Customers

Product Performance & Product Development highly value the quality of data to perform analyses so that the information can be used either for improvement of products or new product development.

Technical Customer Service Managers: Interviews revealed that *time* is of high priority for TCSMs. Having more time will allow them to deliver value to customers in form of interaction to tighten relationships, and training workshops in i.e. tire technology.

As mentioned in section 1.4, the dynamic in customer relations in a B2B environment can present high levels of complexity. Hence focus will be on speed as a competitive

advantage to deliver value to customers. There are many benefits related to speed. Majerus found that "*fast is better than slow*" and although he refers to the importance of speed in R&D, it can also apply to the aftermarket processes. One of the main benefits that are applicable in this case is to gain *Agile Capabilities* to allow prompt reaction to changes in the market [6].

The expectations of both external and internal customers are congruent since by having a quick and agile process that allows delivering a fast and effective response, it will also help internal customers, namely, TCS to have more time to focus on customer interaction rather than focusing on administrative tasks.

In conclusion, value is then defined as:

- **Fast and effective response** for external customers. As for internal customers,
- **Data quality, and freed capacity** to deliver value to external customers

4.2 Focus on Value Stream - Go See & Grasp the Situation

The collection of data was made by Skype interviews, one-on-one interviews, Gemba walks, Value Stream Mapping workshops, and online surveys. The first interviews were carried out in GIC*L mainly with the Product Performance team in order to get familiar with the process, identify the needs and how they experience the output of the process. Further, to effectively address the main gaps, interviewees were then encouraged to focus on the 80/20 rule, where 80% is identified as a recurrent situation, whilst 20% as a rare or never occurring event.

The choice of the participants for the VSM workshops was based on the level of cooperation across functions. Besides having deep upper-level knowledge of the process, the TCS team in Country A has developed a close relationship with logistics partners by:

1. Understanding the suppliers work by performing regular Gemba walks.
2. Cooperating to develop problem-solving skills.
3. Sharing information intensively but selectively and insisting on accurate data collection.
4. Conducting joint improvement activities.

Further, what differentiates country A from most of the EMEA countries is the low diversity of logistic partners involved in the process.

4.2.1 Laying the Groundwork

One of the first activities to start planning the workshops was to find management support. To ensure full support it was necessary to communicate the purpose and objectives through a Value Stream Mapping charter. The content of the charter was discussed and agreed during a review session with stakeholders from the Product Performance team. A further review to achieve consensus among the mapping team members was made prior to the current state mapping session.

The Value Stream Mapping charter's main purpose is to plan, communicate, align, and build consensus on: Scope, current problems and needs, measurable target conditions, benefits to customer and business, relevant data, accountable parties for improvement efforts, the members to constitute the mapping team.

4.2.2 Scope

Karen Martin [34] highlights the importance of narrowing the scope to avoid the risk of spending unnecessary long hours trying to assess every possible variation in the process during the current state mapping activity. The proposed way to achieve this is by classifying specific conditions in accordance to the product family.

Specific Conditions

Warranty claims regarding Consumer & Commercial tires that are entered by either customers or sales representatives which resolution end up in either remittance or denial of the claim.

The product families were early identified during the scope definition of the investigation. Although there are some differences in manufacturing aspects, the processes for claims handling are very similar and hence, consumer and commercial tires are considered to belong to the same family, see figure 4.1. Consequently, there was no need to perform an analysis on the product mix segmentation.

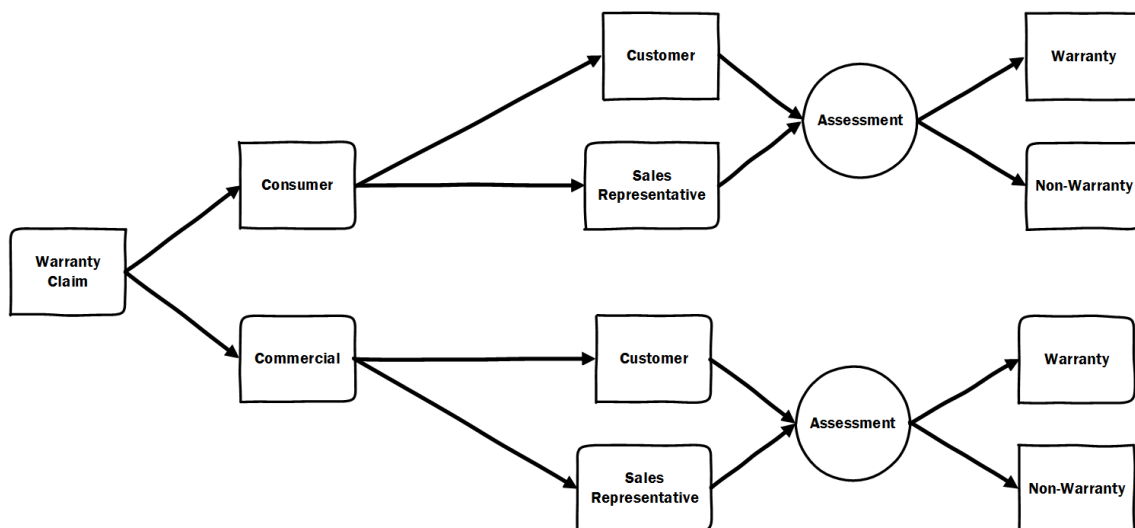


Figure 4.1: Specific Conditions according to product family

4.2.3 Current Problems & Business Needs

The quality of the data that is available in the field is of major value for performing analyses, the results of which will contribute to improvements in future products. Clarity of the process results is also essential to ensure appropriate improvement actions which will lead to a system in which a prompt response to resolutions is a fact to meet customer demands. There is also a need to stabilize and align the process throughout EMEA by first finding outliers contributing to variation. In most organizations, it is possible to find siloed functions which are hard to identify without looking at the whole value stream. To close the gaps created by silos or address the causes creating the silos, it is key to improve cross-functional communication.

- Better quality of data for analysis on the performance of products which is needed for the product development/improvement process
- Process transparency to ensure appropriate improvement actions
- Fast response to customer demands to ensure customer satisfaction
- Identify waste to improve the work TCS teams
- Stabilize and align the process throughout the EMEA region
- Improve cross-functional communication.

4.2.4 Benefits to Customer and Business

Customer

- ✓ Fast and Trustworthy response

Business

- ✓ Confidence on data for analysis
- ✓ Confidence on performance indicators
- ✓ Reduce stress and improve working relationships
- ✓ More time for improvement efforts and technical tasks for TCSMs
- ✓ Baseline for strategic decision making

4.2.5 Activity Kick-Off

Although the logistics for the first value stream walk was upfront planned, non-foreseen circumstances made it impossible for the facilitator to be present on site and a video conferencing link was arranged for the meeting. The environment was also carefully chosen so that participants could express opinions freely. Hence, the location selected to carry out the mapping activities was the Technical Customer

Service office in Country A.

Since not all the team members were familiar with VSM, the session started with a brief introduction to the principles as well as an overview of the agenda and commitment required for the three sessions. Following the introduction, the Value Stream Mapping charter was presented and reviewed by the team without opening a debate on the content. Once the objectives were agreed by all participants, the rules of engagement were presented.

Rules of Engagement

Karen Martin [34] recommends selecting rules of engagement so that to create a team culture during the sessions. These are as follows;

1. No interruptions; the team stays 100% committed and focused
2. All wireless devices on silent mode or off
3. No emailing or texting except during breaks
4. Rank has no privilege
5. Finger pointing or blame has no place
6. Seek the wisdom of the team instead of the knowledge of one
7. Use creativity over capital; mind over money
8. Think externally. Eliminate siloed and “us” vs “them” thinking
9. No silent objectors
10. Respectful disagreement
11. What is said in the room stays in the room until an appropriate plan for communication is defined
12. Eliminate “can’t” and “No, because...” adopt a “yes, if...”-mindset
13. Avoid; “This is the way we’ve always done it”
14. Ask why? why not? and what if...?
15. Be bold

Although there was no objection to the rules, some of them were not fulfilled or had little effect on the culture of the team during the workshops. These aspects will be discussed later.

4.2.6 Choice of Process Metrics

Kate & Locker [31] recommend the use of metrics that make sense to measure the company's process. The metric that is widely used by different countries in the EMEA region is the lead time (LT) (*AKA: Cycle Time*) from the moment the claim is registered in the online platform, until the moment the Technical Customer Service finalizes the request by either sending a rejection letter or accepting the claim by creating a credit memo request in the ERP system. Process time (PT) will give us information about the value-added time for the process. It will also reveal the processes that are directly adding value to the customer needs. The Process Cycle Efficiency (PCE), (*AKA: Activity Ratio*) is the ratio of the process time to the lead time.

$$PCE = \frac{PT}{LT} \quad (4.1)$$

One metric that was put to the test is the Percent Complete and Accurate (%C&A). Keyte & Locher [31] describe this metric as a way to outline the quality of information in terms of completeness and accuracy from the point of view of the downstream recipient. As an example; Paper work might not convey the necessary information to complete the task without delays since rework is required. "If an order is faxed to customer service, they might review the order for legibility, ship-to, etc. The percentage of orders customer service enters without any problems is the %C&A" [31]. The impact of this metric will be discussed later.

4.2.7 Current State Mapping – First Walk

Choosing to perform the mapping activity "*where the work is done*", is in line with the Lean philosophy. Gemba, the Japanese word for "the real place"- referring to where the work is done, is fundamental for achieving accurate results on a VSM activity. It is a way to observe the work and to meet the people performing the work in their own environment. It also provides a deeper understanding of the process allowing participants to break through the norms of existing working conditions and by studying the process from an outsider perspective, people performing the daily activities often deviate focus towards performance problems that otherwise remain undetected [34].

4.2.8 Mapping the Current State

The session started by defining the triggering action of the process, in combination with the starting and finishing point in line with the Value Stream Mapping Charter. The facilitator guided the team through the shared screen to visualize the boxes created in Xmind Software [21].

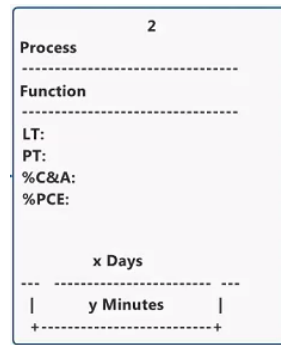


Figure 4.2: Process Box used during Current State Mapping

The first workshop not only revealed the current state of the process, but also the current vision and beliefs in the process. At this stage, the VSM was still not completed. There was a strong conviction that the overall process was very efficient and bullet proof, even superior to the competition. This is when the question that would change the dynamic and mindset of the team came up.

Jeff Mathews asked the team: “So... What are we trying to fix here?” to which one team member replies: “Well, that is a good question... I think we have a quite good process.” Although the VSM Charter describes the aim of the workshops, it was difficult for me to reply to the question in a few words. Jeff replies quoting Shigeo Shingo:

“To make a process improvement; step 1: make it easier; step 2: make it better, step 3: make it faster, and lastly... normally if you already performed the mentioned steps, the process is already cheaper, but you can do another loop to...; 4: make it cheaper.”

The VSM Charter describes in detail what should be improved, but the way of how the goal with the value stream sessions was described, made it possible for everyone in the team to adopt a common mindset for starting to reflect on how the future state should be like. During this first session, it became very clear that the TCSM’s major concern was to find ways to improve the lead time on certain cases involving commercial tires. Although it is a few number of tires in comparison to those going through the standard process, this variation was creating a big impact on customer satisfaction. In most of these cases, the customers are big fleet owners having thousands of trailers operating across Europe.

“Pick the low hanging fruit and get results. Find the root causes before you fix problems” - Norbert Majerus

Due to the urgency in which the concern was expressed by the TCSM, the “low hanging fruit” was identified. It became even clearer as the same concern came to surface during the rest of the workshops. But before starting any improvement efforts, it was needed to get more information about this specific process and identify

the root cause before taking action. A parallel investigation called RMT Case was started, see section 5.3.

4.3 Data Analysis

4.3.1 Process Visibility

Figure 4.3 depicts one of the most important revelations made by the value stream mapping activities. The specific output condition for these graphs represents the cases on which the **warranty claim has been accepted** resulting in a credit note to the customer. The figures reflect the limitations on the span of control that the TCSM has in the value stream and reveal additional lead times to those that are being monitored to assess the overall performance.

Figure 4.3.a represents the processes that are tracked as the order entries are registered in the ERP system and a waybill is sent to the logistic partner to initiate the collection of the tire. This is when the lead time starts to run and it comes to an end as the TCS finalizes the process by remitting the case.

"Data is of course important [...], but I place the greatest emphasis on facts" – Taiichi Ohno

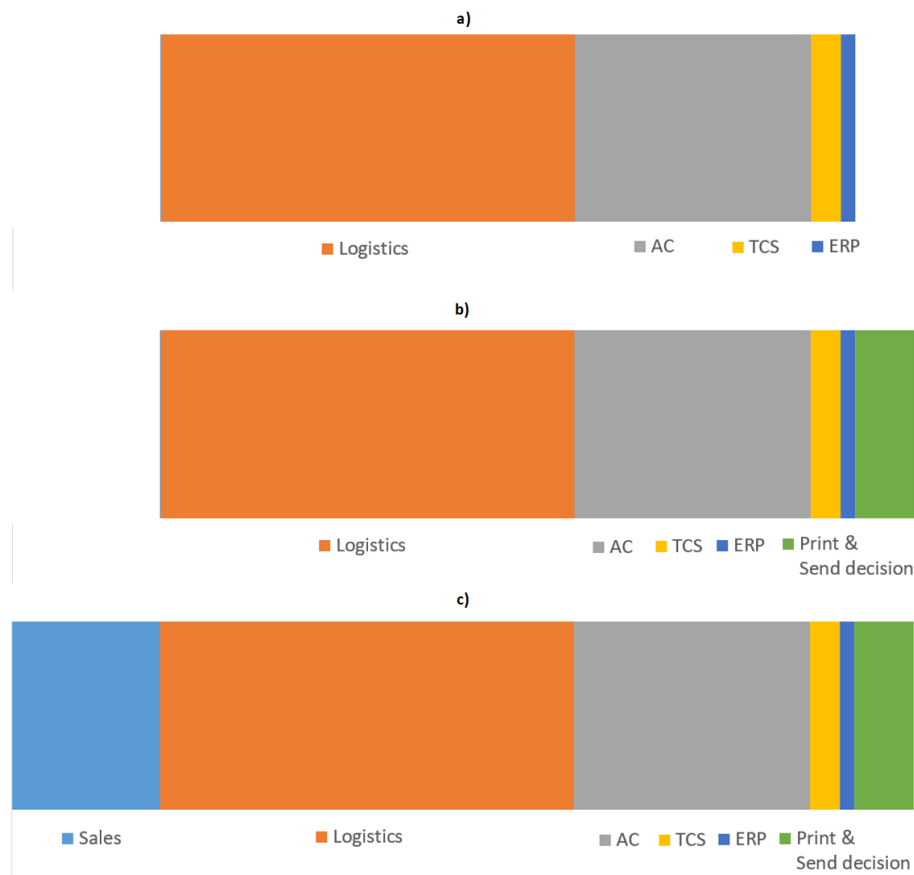


Figure 4.3: Visibility of the Process - Data versus Facts

The lower pictures in both figure 4.3.b and 4.3.c, represent the reality on how the customer experiences the value stream according to the results that the VSM workshops revealed.

In figure 4.3.b, a green portion to the lead time has been added. This represents the time it takes from the moment the TCS has granted a credit note on the warranty claim until the customer receives the notification. In this process, a hard copy of the resolution is printed and sent to the customer with all the necessary details of the warranty claim. Since this operation is centralized in a specific country in Europe, and performed by a department processing all printed documentation for the company, it becomes invisible not only for the TCSM in Country A but also for the ERP system which is the source of information for the TCSM. Hence, to what we initially knew about the lead time, the time to perform this operation should be added as it is needed 100% of the cases.

The light-blue portion in 4.3.c depicts the interaction between the sales representative and customer prior to the order entry of the warranty request in the system as the sales representative has also the possibility to enter the customers' claim cases. The interaction is often subject to the complexity of the market, culture, local regulations, and customer/sales relationships. Previous to the mapping activities, it was known that sales personnel played an important role in the claims process, but

not to which extent. For this reason it was considered pertinent to have at least one representative in the team to get an insight of the front-line of the business. It was revealed that sales representatives' intervention in the value stream occurs in almost 50% of the total warranty cases in Country A. The dynamics in the relationship customer/sales have not been fully understood during this study. To get some more insight in this complex environment and to corroborate the levels of involvement, an online survey was distributed among twelve sales representatives in Country A. The main question (among others) to answer was:

"What is the reason why the customer requires your assistance to submit the claim?".

Most of the answers pointed at a "service expected by the customers". This was an attempt to scratch the surface of the different underlying reasons to the answers. Hence, it is hard to conclude whether this process that increases the lead time is adding value to the customer or not. Further investigations should be made on this matter. The fact that still remains is that in 50% of the cases, there exist a significant variation in the lead time.

4.3.2 Waste Identification

- **Transportation:** As the case of the warranty request is handled by GOODYEAR, the impact on the lead time is minimal in comparison to the impact that transportation has before the case can be finalized. Therefore, transportation in the process can be classified as non value-added activity having a reverse impact on what customers value - Speed. In figure 4.3, the orange section represents the transportation share in the whole system. Addressing this significant portion of the value stream would result in a major improvement in the lead times.
- **Inventory:** Since the current process relies on transportation, inventory is inevitable. Tires form part of the inventory at the dealer before the tire is transported, at the logistic partner's warehouse before transportation to the Adjustment Center (AC), at the AC's warehouse before and after inspection. Storage of documents at the TCS has also been discussed; paper documents become more and more obsolete as Enterprise Resource Planning (ERP) systems become more efficient.
- **Motion:** Unnecessary movement i.e. looking for information/documents.
- **Waiting:** Customer waiting for a resolution, employees waiting for starting the activities, tires waiting for analyses, customer claims waiting for entry by TCS, analyses waiting for processing.
- **Overproduction:** Processing "just in case" or more than required - this is a key waste in the current process... are we processing more than is really required? The future state proposal suggests that.
- **Overprocessing:** Excessive work for delivering a result, redundant activities. Checking for inspection results two or more times per day.
- **Defects:** Inaccurate information and data entry.

- **Skills:** Employees confront barriers to develop to their full potential as administrative workload increases.

4.3.3 Levels of System Interaction

It was found that there are three different levels of interaction of different characteristics (*see figure 4.4*), hence directly affecting the quality of data that is handed over to perform analyses. Throughout the development of the process, every hand-off creates a drop in data quality. Unlike other markets like North America, GOODYEAR do not franchise businesses for dealerships. For instance, in Europe, tire dealers are often a franchise of a major tire retail organization i.e. Euromaster, Däckia, etc. This business model allows dealers to offer a big variety of tire brands to meet their customer demands. Therefore dealers do not feel accountable for the accuracy of the information entered in Eclaim as long as the minimum amount of information to register a warranty request is accepted by the system. Information that is often unclear is regarding vehicle model, mileage, axle position and other end-user related data. Once this information is handed off in the platform, the logistic process is initiated and the tire is transported to an adjustment center (AC) where an in-depth assessment of the tire is performed. At this stage, the quality of data has already changed character. The information initially entered by the dealer is not as relevant for the AC since the focus lies on the physical condition of the tire. Once the tire has been inspected and a resolution is made, the Technical Customer Service Manager will analyze the results given by the AC together with the data entered by the customer. As a result the TCSM finalize the warranty claim by assessing its validity based on the warranty policy. Consequently, all this information is processed by the Product performance team which in combination with evidence provided by the manufacturing process of the tire in question will form the data package to be analyzed. These analyses are finally handed-off to the R&D department which will take measures for the improvement of products.

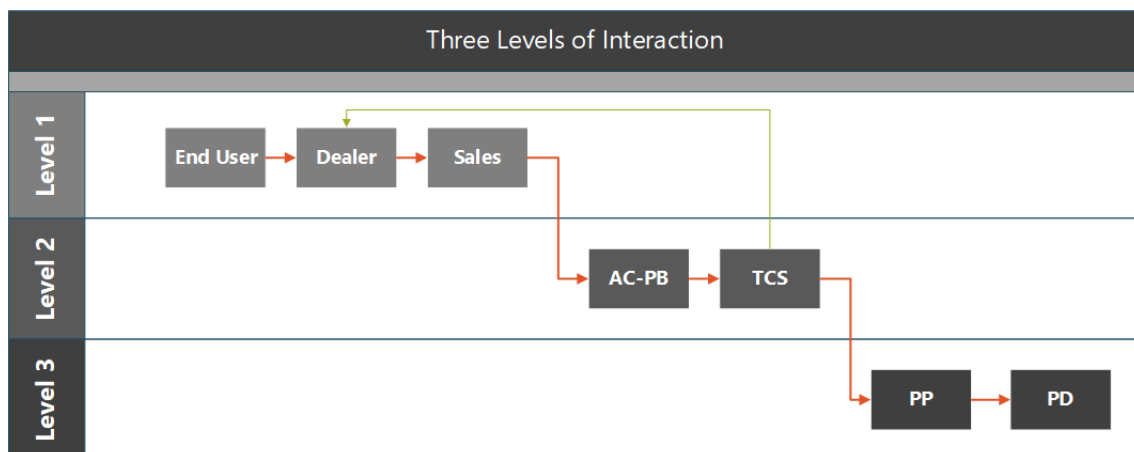


Figure 4.4: The three levels of interaction

Level 1, is what I call the **Customer Centered level**. It corresponds to the business front-line interactions between customer-consumer and sales-customers. At this

level, the focus lies on maintaining good relationships to both satisfy the customers' immediate needs and ensure long-term profitability. It is important to highlight that warranty claim cases form a minor fraction in relation to sales agreements. Hence, the implications of the importance of user data play a minor role as long as the minimum amount of information for claim entry in Eclaim is fulfilled. Once this is done, the information cascades to *level 2* which is identified as the **Product Centered level** since at this stage of the process the focus is on the physical condition of the tire and the inspection results from the AC. TCS rely on the information provided by the AC in order to finalize the claim. However, evidence reveals a considerable amount of cases in where information provided by the AC present difficulties to the TCS as additional information to the condition of the tire needs to be translated from German to the local language in where the TCS is operating. In some cases, this information is crucial for the outcome of the claim. The hand-off of information finally reaches the **Data Centered level**, *Level 3*. Here, the interaction of the Product Performance team and R&D is based upon the data that has been created by the two previous levels of interaction. Although logistics might interfere with the data quality in some cases, i.e. inadequate handling of claimed tires, their implication has been omitted in this graph.

By looking at figure 4.4, it becomes evident that throughout the process there is a big ambiguity regarding the availability of rich data and the levels of importance for each level and as a consequence, contributing to an important misalignment, see figure 4.5.

4.3.4 Data Quality

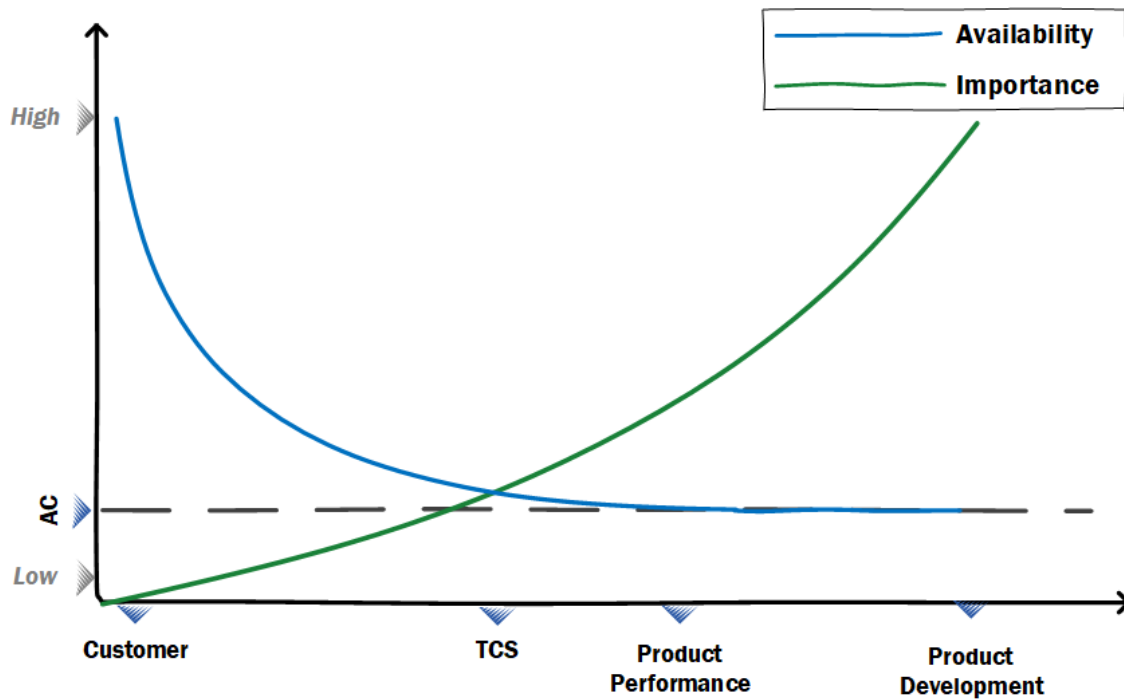


Figure 4.5: Quality of Data - Availability vs. Importance

Figure 4.5 is a representation of how the quality of data (blue line) diminishes until it reaches the empirical level of quality (dotted line) provided by the AC. This quality level will remain constant throughout the rest of the process. The green line represents the importance levels of field data from the market place to R&D.

In fact, this ambiguity creates a slow flow of information making it deteriorate over time and thus, losing its value. Stalk and Hout [35] argues that the only way to cope with aging information throughout the supply chain, is to “*compress the information time so that the information circulating through the system is fresh and meaningful.*” As in many supply chains, the true demand by the end user and the data richness it possesses is in the hands of its closest player [36], in this case, the dealer (customer). As shown in figure 4.5, the closest player to the customer is the TCS which is at the intersection between the information delivered by the AC and the customer, hence their key role in this current state.

What this analysis also tells us is that the value of the process lies in combining the needs of all players in the value stream by making them visible to everyone. Moreover, it shows the silos that are found in most organizations as the information flows sequentially.

4.3.5 The External Customer

We know that every company strive operation strives to add value by delivering a service to meet customers expectations with an optimized use of resources. Dealers need to be able to handle different processes for submitting claims provided by different tire manufacturers. The levels of user friendliness of the service provided by tire manufacturers are crucial to support the customer ability to minimize variation of tasks and ease the daily work and allow them to focus on end-user satisfaction. But the reality is that dealers need to be able to manage a big variety of different claim processes with different levels of complexity, see figure 4.6.

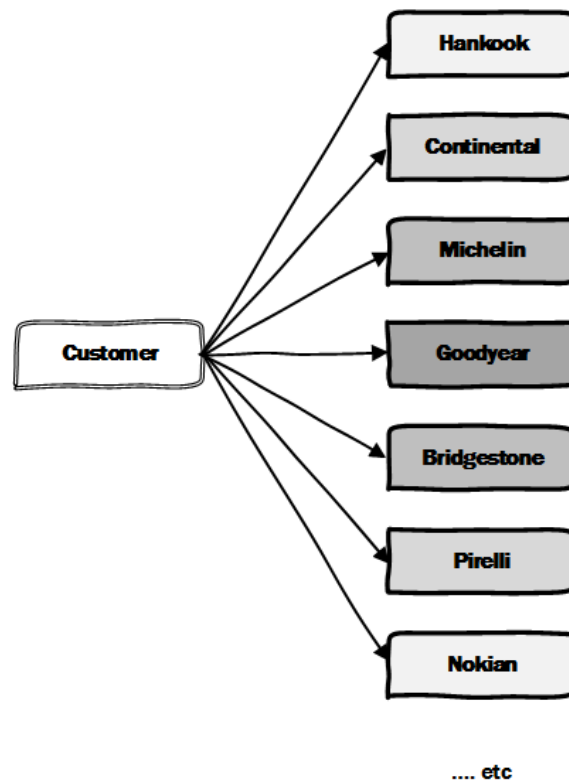


Figure 4.6: Different claims processes handled by the customer

Benchmark on Competition

To corroborate this assumption, it was decided to investigate the complexity of the different claims processes provided by different tire manufacturing companies, including GOODYEAR. It was found significant differences on:

- ✓ Lead times from claim entry to claim resolution
- ✓ Dealer/Tire manufacturer warranty claims interface for claims submission and claims resolution processing
- ✓ Instructions given to dealers on how to handle claimed tires
- ✓ How dealers interact with the different logistic partners

The results revealed by the benchmark contributed to the awareness of the different processes that dealers need to handle and the difficulties that they affront on a daily basis to minimize variation in their internal processes. They also provided a further perspective on how GOODYEAR stands against competitors and with it, the opportunities to improve in order to *"help customer win in their markets, and become consumers' preferred choice"* (see figure 5.4). Along with the results from the current state VSM workshops and interviews, this data also contributed to the design of the future state VSM.

5

Results

5.1 Current State

Figure 5.1 represents the result of the current state VSM. The current state map was considered as a draft until the content was agreed and validated by the team. Not all questions regarding the system were answered during the workshop. Hence, further investigations were required in order to identify the gaps.

The content of the process boxes indicates the process to be handed off to the next function. It also describes the responsible function to carry out the process or activity. In addition, the following metrics help to measure the performance of each individual process; Lead Time (LT), Process Time (PT), Percent Complete & Accurate (%C&A), and Process Cycle Efficiency (PCE). A further description about these metrics and their implication is found in section 4.2.6.

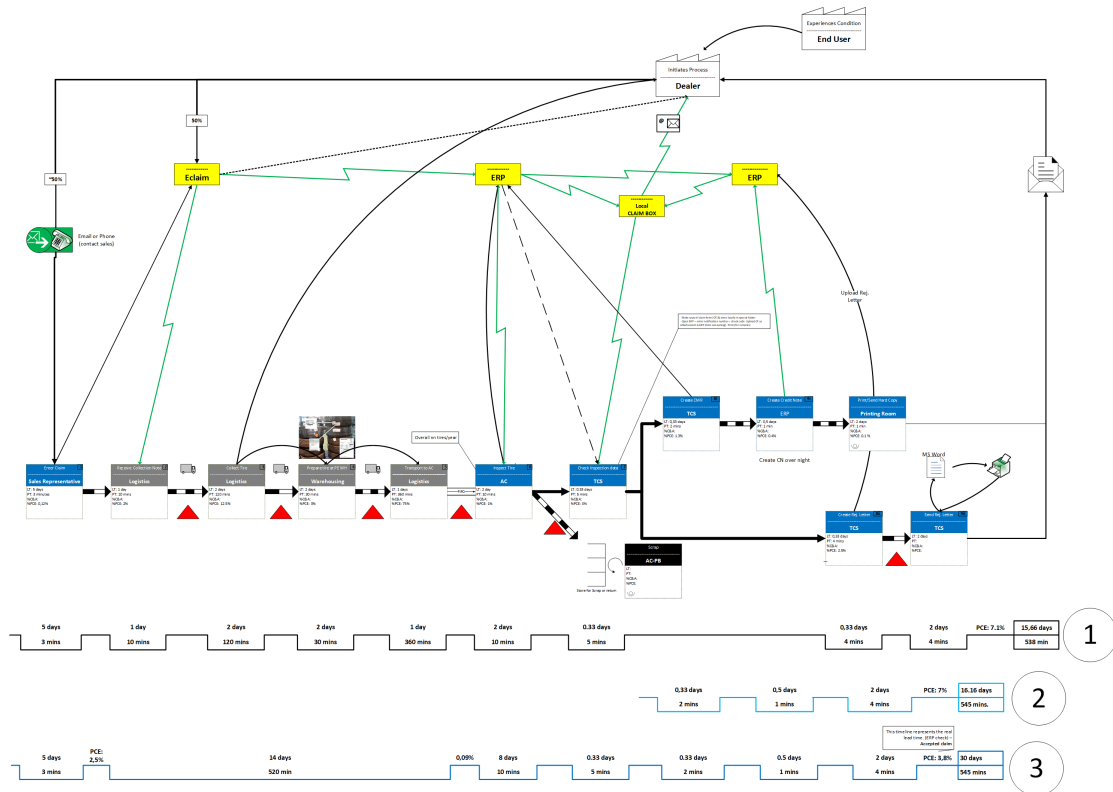


Figure 5.1: Current State Value Stream Map

The process is triggered by the customer in the upper right side of the VSM. During the mapping activity, it was found that the sales representative is involved in 50% of the cases. For this reason, the process line diverges into two alternatives: a) the customer enters the claim in Eclaim and b) the customer requires the assistance of a sales representative to enter the claim. The yellow boxes represent the systems involved to convey information in the system. Eclaim is the platform which is in direct contact with the customer, ERP or Enterprise Resource Planning collects the information from the customer, making it visible to TCSMs and Product Performance. Finally, the local Claim Box collects and sorts the claim cases into different categories. In addition to them, the conventional communication channels such as telephone in the far left and snail mail in the right side of the VSM.

The process boxes are colored in blue and gray to easily differentiate Goodyear processes from those performed by the logistic partner. As the physical inspection is done by the AC, the process line bifurcates to represent both remittance and denial of the claim case. Figure 5.1 shows three different timelines. Timeline 1 (TL1) has been originated assuming ideal conditions to keep the focus on the processes involved in the value stream by not discussing every possible variation. The ideal conditions refers to an order entered in Eclaim during first working day of the week, before noon. The process follows the same path until the physical inspection at the AC. TL2 represents the lead time for an accepted claim. As Jeff Mathews commented before the mapping activity: “We cannot rely on the information we are going to get in the timeline... people tend to either underestimate or overestimate the time it takes to perform a certain task.” Hence, it was decided to review a randomly chosen case that was representative of the ideal conditions represented in the VSM. It was found that such a case also presents variations in the system as the time to finalize it was 46% higher than the initially known in TL2.

5.2 Future State

Based on the information gathered by interviews, benchmark and VSM workshops, the future state represents a radical change from the current state. The objective of the future process is to further minimize the gaps that stand between customer satisfaction and field data quality by eliminating the logistics process from the customer experience. The implications of delivering an immediate response will eliminate or at least minimize the risks imposed by the hand-offs in the current process and therefore, increase the ability to achieve both objectives. The mindset of creating an *easier, better, faster and cheaper* process is also reflected in the future state. Here the focus still lies on the first three characteristics of an improved process. Gaining financial benefits (cheaper) is considered as a result of an easier, better and faster system.

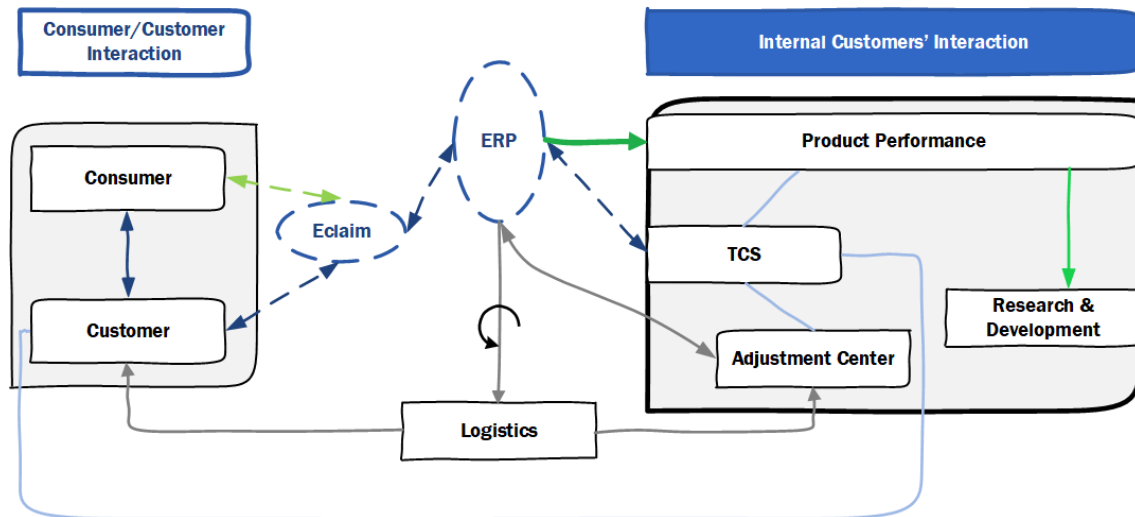


Figure 5.2: Future State representation

Figure 5.2 is a representation of the future state which primary focus is on allowing the customer (dealer) to deliver an instant response to the consumer. The system for claims processing is segmented to two dimensions which clearly define the consumer/customer interaction in a closed-loop and the interaction between internal customers. The dotted blue line represents the path of information from claim entry to instant claim resolution from the TCS. The information goes through the customer interface (Eclaim) and ERP system. The green dotted line between the consumer and Eclaim represents a suggestion to through ICT solutions, involve the consumer in the claims processing in order to reinforce the quality of field data. The data gathered during this process is then handled by the Product Performance team to perform analyses (green line). The initiation of the collection process will be started If, and only if a product is required for further inspection. This process is represented by the physical pull arrow and the gray lines.

This future state scheme is based on the fourth step principle of the GOODYEAR IMPROVEMENT WHEEL, "Implement Pull" to supply the service only when it is required by the customer and when it is required by GOODYEAR. This will allow for all players involved in the system (consumer, external customers (dealers) and GOODYEAR's internal customers to both "PULL" value from the process and create value for the system when it is needed, and in the needed amount. This model will also allow the company to regain visibility of the consumer and shorten the response to customers from days to less than an hour.

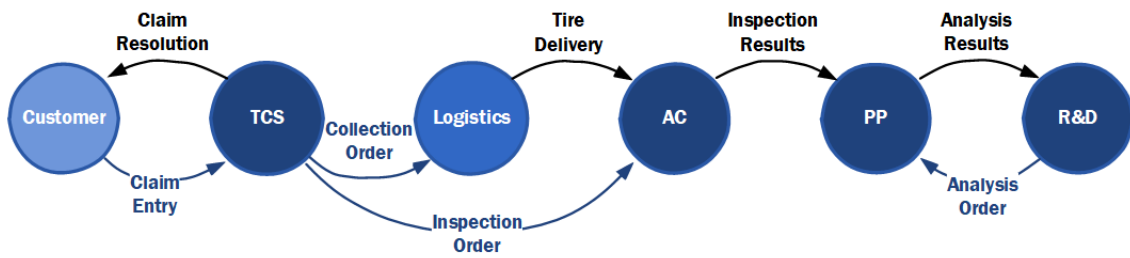


Figure 5.3: Flow in the future state

The flow of order/delivery to a triggered tire collection process is depicted in figure 5.3 which occurs independently to the claims resolution and hence, the logistics process is eliminated from the customer experience. Planned shipments of tires will also allow the Adjustment Centers to reduce inventory and improve the flow of tires through the inspection process.

5.2.1 Future State Connection to Corporate Strategy

The Primary goal in the future state strategy is to “anticipate and respond to customer’s needs” by delivering a quick response through the integration of faster communication channels when assessing the condition of the tire. In this way, GOODYEAR will help customers to focus on consumer satisfaction which is a precondition “to help customers to win in their markets” and consequently, laying the ground for GOODYEAR to become “customers’ preferred choice”. Since the future state is based upon the philosophy of a controlled flow of products through the chain, it will contribute to an effective management of inventory in terms of warranty claimed tires, and work in process in terms of claims handling. A Kanban system will trigger the transportation process in order to perform an in-depth inspection to acquire the right data to perform analyses. Thus, it will help to create a closed-loop system for *Operational Excellence* improving data quality and efficiency through assessing *the right tire, at the right place, at the right time for the right cost*.



Figure 5.4: GOODYEAR Strategy Roadmap

The GOODYEAR Strategy Roadmap in figure 5.4 contains all the ingredients to prepare the organization to take a new direction. The key is to provide the conditions to *embrace change*. The markets are intrinsically unstable in the long term due to changing customer expectations and new as well as existing competitors. As the market changes, continuous improvements must follow. Only by *energizing the team* and promoting collaboration both by implementing training programs on Lean philosophy and forums that allow for open discussion and knowledge sharing, will contribute to an agile mentality based upon a common language. As stated before, a defined warranty claim process was established which over the years, and due to local regulations, culture and capacity constraints has branched out to different versions of the original one. Those changes became clearer as interviews revealed different definitions of “the process” depending on the country in question. Allegedly, knowledge sharing has been affected due to process-language differences that contribute to information silos in the region. Basic knowledge on Lean will create the foundation to an energized and problem solving oriented team fostering cooperation upon a common language to continuously improve the value stream. There might be different “processes” with different ways to measure lead time, but when we speak about value stream, we will only refer to a closed loop system, an end-to-end system. To *deliver results* and *seize opportunities to make courageous decisions*, the team involved in the value stream needs to build confidence upon a common shared vision and language. The focus of the future state process is without a doubt on the customer in order to constantly improve the perceived quality

of the service. *Mastering complexity* requires awareness of the value stream and to peruse the elimination of wastes to such degree that it will allow the organization to *manage the necessary and eliminating the unneeded*. Norbert Majerus states [6]:

"Making things simple does not only apply to high-level processes; it is sound thinking for all levels, including day-to-day work. Most complications in work processes are "self-inflicted" and can be the result of an accumulation of rules and standards over time, which often turn obsolete. Questioning the way we work is a good first step toward making things simple again. Since the complication is self-inflicted, we (individual, function, organization) hold the key to reducing it." – Norbert Majerus

Potential Benefits:

- As the process provides both instant response and user-friendliness, the customer is more likely to provide reliable data to the system as it provides a good quality service to the consumer
- The process will enable the dealer to provide a high-quality service to the consumer
- Quality rather than quantity will provide better field data for the improvement of products
- Gaining speed in the process will contribute to lower aftermarket costs
- Ensure customer retention
- A faster and easier claims process will lower the workload and free capacity to perform training to the sales force, and work with continuous improvements

5.2.2 Opportunities for Improvement

The current state VSM revealed a set of opportunities in form of improvement areas depicted in figure 5.5. The reference point for the estimation is based upon the current state performance and the benefits that the future state should contribute to the six identified areas. This chart not only represents the current state of the studied country but also the results thrown by interviews and observations across the region. As previously mentioned, transportation is one of the major contributors to waste in the value stream. In addition, the configuration of the transportation process contributes to variations from country to country. The variations are subjected to the number of different partners involved in the transportation of the claimed tire. One country revealed the participation of three different companies taking care of transportation, warehousing, and transportation, respectively. This undoubtedly contributes to an increase in the complexity of operations affecting the overall performance.

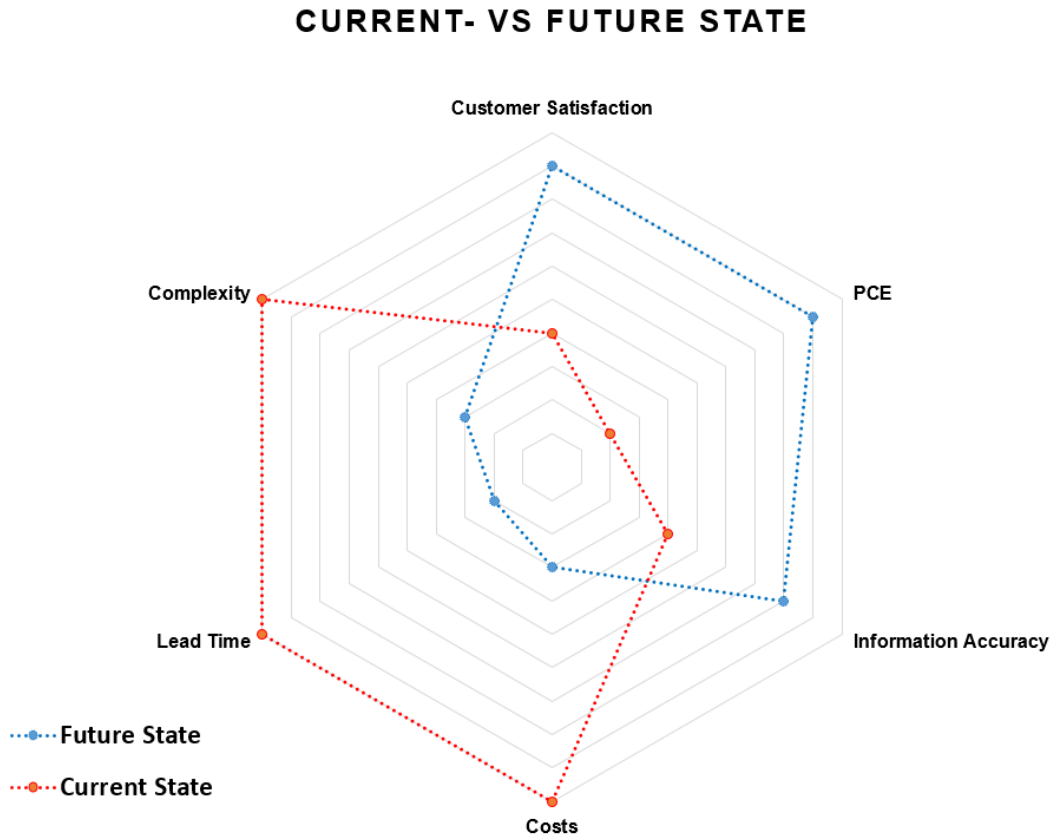


Figure 5.5: Representation of Current State vs. Future State

Following the notion of *easier, faster, better and cheaper*, the first part to address is the *complexity* of the claims handling. Eliminating unnecessary transportation and controlling the flow of tires that are sent to expert assessment in the AC will have positive effects on the lead time and end-to-end claims handling. In addition, an update of the existing customer interface to meet both high levels of user-friendliness and internal requirements on data quality to ensure *information accuracy*, will lead to a faster flow of processes minimizing rework and increasing focus on value-added activities. This will eventually contribute to an increased *Process Cycle Efficiency (PCE)*. It all debouch in a *better* system to satisfy the customer in line with the expectations of a faster response. The benefits of minimizing the operational *costs* will come as a result of the implementation of an easier, faster and better way of claims handling. Hence, the primary focus in the future state design is not on lowering costs but rather on emphasizing the simplicity of a system that will inevitably lead to financial benefits.

5.3 The RMT Case

Norbert Majerus [6] recommends to move on to the development of an A3 once a problem or gap has been identified. For this, a sponsor of the specific A3 is required. Further, since the efficiency of the A3 methodology lies in the possibility for a leader to coach associates in real time without overlooking any important details, it was

also key to find a coach for this A3. Under the philosophy of *Manage to Learn*, this A3 project was coached by Jeff Mathews.

Fleet owners which are considered as key customers in country A are expressing dissatisfaction due to the long lead times to receive a resolution on the warranty claim on specific condition regarding truck tires. In 2016 the average lead time was considerably longer than the average lead time of a standard claims process. Although these types of claims represent a very small part of the standard claims, it is important to address this issue in order to ensure customer satisfaction.

During the VSM workshops, it became clear that the RMT case was of first priority for the Technical Customer Service Manager. Hence, it was considered as the *Low-hanging fruit* to start the improvement efforts. Further, Majerus recommends to "focus on those issues that are tied to the reason why you made the map in the first place and get enough data and facts related to those issues" [6]. One of the main reasons to perform the VSM workshops was to identify causes impeding a fast resolution to the customer. These types of claimed tires need to be inspected in another location instead of the AC, thus influencing the transportation times causing variations in the process. The aim of this investigation is to identify and eliminate this variation.

The y-axis (*Frequency*) in figure 5.6 represents how frequently the RMT claims (which are identified as outliers) occur in comparison to the standard claims. RMT-claims' frequency and how they affect the lead time are represented with an 'x' in figure 5.6.a. Figure 5.6.b represent the future state which aims to eliminate the variation and shift the outliers back to norm.

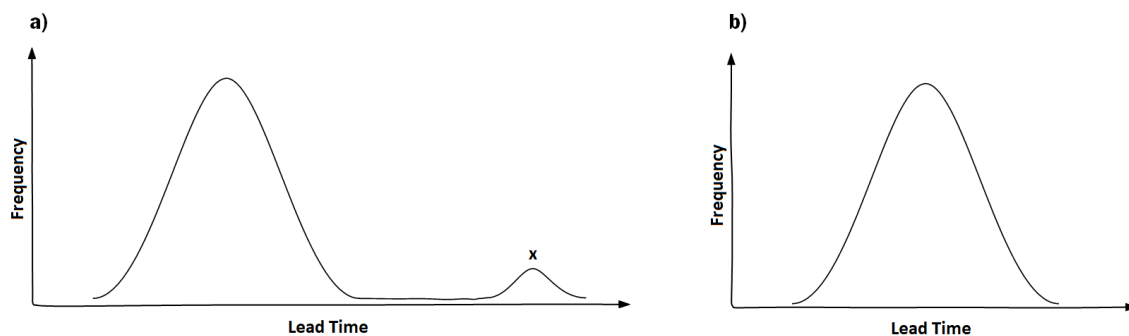


Figure 5.6: Non-scalable representation of process deviation

The model to address this problem is also based on the GOODYEAR IMPROVEMENT WHEEL with the primary focus on the two first steps.

5.3.1 Specify Value for Customer

Most of the times it is challenging to identify and specify customer value. In this case, the aim is to deliver value in terms of speed and eliminate delays that are affecting customer satisfaction. The assumption made for defining value is that customers demand to get a resolution within a reasonable time frame. In the Kano Model, this expectation cannot be identified as other than an expected output of the process and hence, a *"Must-be quality"* delivered is key. Consequently, any delays related to a decreased performance in the process will quickly affect the levels of customer satisfaction. See figure 5.7.

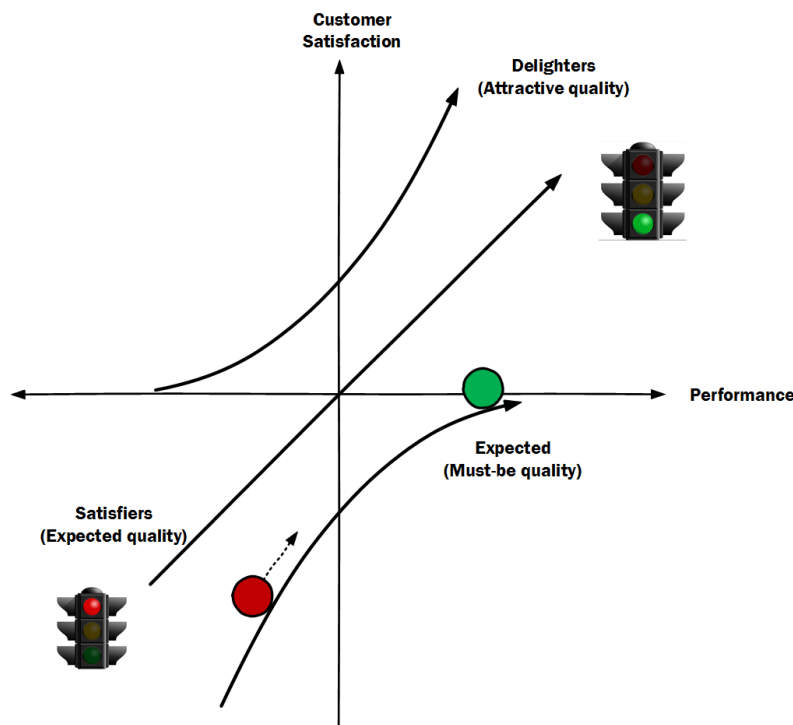


Figure 5.7: Kano Model

"The Kano Model: Must-be quality is the ability of a product or service to fulfill the basic needs, that are so fundamental and self-evident, that the customer does not even mention them when asked. Expected quality is the corresponding ability to fulfill expected, and spoken needs, largely identifiable through customer surveys. Attractive quality contains a surprise element and means that excitement needs are satisfied. This often results in customers, who are faithful and loyal to the company" [32]. Value is then specified as:

External Customer:

- Fast resolution of the claim request

Internal Customers:

- TCSM: Fast resolution will allow a good relationship with key customers to be maintained.
- Product Performance: Better data quality.

- Company: Contribute to customer loyalty

5.3.2 Focus on Value Stream - Go See & Grasp the Situation

To pinpoint the problem areas it was necessary to zoom into the value stream and inevitably to "go into the weeds" without getting lost and keeping a reasonable high-level view of the situation. In operation strategy terms it would be a balance between the supply network and the operational level, (*see figure 3.4*). As Majerus recommends, going to Gemba was the best way to get an understanding of the situation [6]. During the Gemba walks it was possible to talk to the personnel in charge of handling this type of claims and pertinent information about inventory, tasks, data records and sequence of tasks was gathered. With the data gathered on site, it was possible to map the process in a Value Stream Map. This representation of the outliers was then added to the current state VSM created during the workshops at country A. As learned from the workshops, the information about lead times often results in either "too optimistic or too pessimistic". Additional information from the EMEA region was also required in order to assess the impact of this deviation. Therefore, it was necessary to ask for support from Product Performance analysts to retrieve data both for assessing the magnitude of the outliers, as well as to corroborate lead time information gathered during the Gemba walks. At this stage, there was enough information to accurately visualize the process in a VSM format describing the lead times, communication channels, inventory, etc. This approach to mapping the process deviates from the traditional one since no workshops were arranged, but it served as a perfect approach to depict the situation in the A3 in order to help to an understanding of the current situation.

Work on the A3 to communicate the need for change

Following the structure of the A3 proposal, it was possible to describe the background of the problem, the current situation, goals and future state in accordance with the steps suggested by John Shook in the book *Managing to Learn* [13]:

1. Background ✓

The business reason for this issue. - Link to the business goals. - Specification of what it is within the scope and what will be left outside the improvement effort.

2. Current Condition ✓

Description of the problem and the gap in performance. - The current situation versus what needs to be happening. - Go to Gemba. - Current situation versus what needs to be happening. - The facts indicating that there is a problem. - Break the problem into smaller elements. - Show facts and processes visually (VSM).

3. Goals ✓

The specific improvements in performance that are aimed to achieve. - Visual representation of the impact.

4. Analysis ✓

5. Results

Define the specifics of the process indicating the reasons why the problem exists.

5. Recommendations

The options for addressing the gaps and reach the goals. Always start with two or three alternatives to evaluate.

6. Implementation Plan

The implementation plan section covers the main actions and outcomes in the implementation process and their sequence. The Resources required, role and metric definition and a graphical representation of the implementation plan.

7. Follow-up

Follow up on actions, impact, targets, results, unintended consequences, sustainability, learning.



Figure 5.8: RMT Case A3

During the interviews prior to the A3 work, evident solutions were expressed by the manager of the AC. He considered that making a relatively small capability investment to handle these types of claimed tires at AC would be the most suitable countermeasure to avoid the long lead times caused by transportation and thus, bring the outliers back to the norm. Another aspect that has been investigated is whether there exists redundancy in the process by considering the rate of rejection of these types of claims in relation to the costs of both transportation and low levels of customer satisfaction. After carrying out an analysis by looking at the numbers in the ERP system, it was possible to observe the process in a more critical way and thus question its purpose.

The efficiency of the A3 is evident since the document has been socialized among associates to be used for discussions to understand the opportunities for improvement.

At this stage, the A3 is still an ongoing work and improvement plans are being analyzed for deployment in order to eliminate a major portion of the unnecessary non value-added activities created by the logistic processes. The value of mentioning the RMT case procedure is to highlight the Value Stream Map as a powerful tool to describe the current situation in the A3 and thus, to communicate the urgency of change at all levels of the company.

6

Discussion

After a further analysis of the VSM results, it was possible to identify silos in the claims process that contribute to a limited visibility of the value stream. The lead times that are being monitored do not accurately represent the customer experience but rather the internal processing as the case becomes visible in the ERP system. Simultaneously, interventions from the sales force contribute to significant time variations of the value stream. Further, transportation has been identified as an unnecessary non-value added activity since it counters the customers' expectations of getting a fast response. Requiring a major share of the total lead time, transportation of claimed tires is then considered as pure waste.

The independence of each function in the system to operate and the sequential information flow to process the claim cases lays out the evidence of a current system design which characteristics are comparable to the conventional approach to operations mentioned in chapter 3. Moreover, the processes at a system level were lacking full visibility to objectively assess the value stream performance. This fact is supported by the levels of interaction that are depicted in figure 4.4 where the interests and value definition differs depending on the function. Independent or siloed functions contribute to low levels of cross-functional cooperation and hence, communication becomes vulnerable. Buffers in items of information and products impede a smooth downstream flow not only through the process levels but also through the operations levels. Irregular flow is a major contributor to the creation of wasteful activities affecting value creation since it hides irregularities which are symptoms of more deep-rooted problems. One of those problems is the aging marketplace data losing its value after every hand-off. It constitutes the major barrier to perform field performance analyses upon relevant inputs. Hence, There is a need to make the marketplace data relevant to all players in the value stream and the future state strategy presented in section 5.2 suggests a way to compress the information time to ensure marketplace data to remain fresh and meaningful. To put these findings in perspective, the benchmark helped to assess the current process to reveal plenty of opportunities for improvement to both make the process *easier, faster, better and cheaper* and *help customers to win in their markets*.

What clearly differentiates VSMs from flowcharts is the timeline which identifies lead and process time. Having this dimension is crucial to assess the process efficiency and I had very high expectations about what this dimension had to reveal. But as Jeff Mathews said “We cannot rely on the information we are going to get in the timeline... people either underestimate or overestimate the time to perform

a certain task”, and this is exactly what happened. I realized that not trusting the timeline in a VSM workshop should not be an exception, but rather the rule. To verify the results thrown by the VSM, close cooperation with a product performance analyst was required in order to get access to records from the database. The analysis revealed a total lead time 46% higher than the one recorded during the current state mapping activity. Once the timeline was corrected, it was possible to get a more realistic overview of the process.

It is likely that the efficiency of the workshops would have been higher if all team members have had more knowledge about VSMS before starting the activity. To prepare the participants, I shared a link to a YouTube video explaining the use of VSM, and it was followed by an on-site crash course before starting drawing the current state. The lack of training did not present any barriers until it was time to identify waste after the current state map was drawn. It generated merely three kaizen bursts (improvement areas) to which any improvement effort would not have had a significant impact in the value stream. On the contrary, it would have generated more stress to the daily activities of TCS when the goal was the opposite. I was eager to start drawing kaizen bursts. But when asking the team where it was possible to find areas of improvements, the response was not what I expected. Eventually, propositions started to be articulated by team members, but most of them pointed towards small improvements that would not have made a major impact on the total lead time. That is when I realized that I was committing a huge mistake. I was forcing the team to find sub-optimized solutions. I was going into the weeds without having a system thinking. Further, the main objective of the VSM workshops was to get insights on how process improvements can be standardized throughout the EMEA region.

One example of sub-optimization is to minimize the amount of paperwork. An improvement which in reality is very hard to standardize since regulations and requirements in the different markets require different kind of documentation, and as mentioned, it would have had minimal impact on the system with the risk of sub-optimization creating more harm than good. The focus was undoubtedly on the process level as depicted in figure 3.4. By trying to find solutions among the weeds, system problems can seem to be unsolvable. Stressing quick fixes might lead to firefighting, communication problems and, increased silos. It seems easy to be blinded by the complexity due to the dynamics of the aftermarket processes. Hence the necessity of simple procedures based on a solid strategy.

The limitations of the study were well defined as they helped to focus on product lines that follow the same procedures through the claims processing, sparing the work on product mix segmentation. On the other hand, it is worth to mention the time limitations. As the project approached its end, much of the complexity surrounding the practices which at the beginning were difficult to understand, started to become subject of considerable attention. It is challenging to propose improvement measures by only looking at the current state VSM. There was a constant feeling something was missing. This "something" was the purpose behind the value stream.

Although the needs of the stakeholders were identified, there was not a common purpose to align the improvements on and hence, the siloed thinking became more evident. To address this, Keyte and Locher [40] recommends the Strategy Deployment as a priority before any VSM activity. The goal with the Strategy Deployment is to “*align effort with strategic need and direction*”, agree on the problems to be solved upon clear targets to be met, and communicate them to all players involved in the value stream. Although the Value Stream Mapping charter is aimed to achieve consensus among the functions, it did not have the expected impact on the outcome of the VSM. Indeed, it helped to maintain a focus among the team members but still, the strategic objectives were not well understood by everyone. This became evident during the current state mapping activity as Jeff Mathews asked the team “What are we trying to fix here?”. The purpose needs to be communicated from management level to group level, and individual level (key to foster a culture of continuous improvement) to make a strong linkage between the strategy roadmap objectives and the targets of value stream performance in the claims processing. Norbert Majerus [6] considers *purpose, process, and people* as three categories vital to manage and sustain Lean efforts, being *purpose* the result of Hoshin Kanri, also known as Strategy Deployment and Policy Deployment.

The VSM is a tool to visualize the entire value stream, propose a future state and create an implementation plan. This could sound very straightforward and there is strong evidence supporting that it is true for manufacturing environments. In non-manufacturing processes, especially in global environments, there are several factors that need to be taken into consideration at the moment of creating an implementation plan. In our case, the future state proposes changes in transportation since it contributes to long lead times and thus, diminishes the value delivered to the customer. With transportation as a big part of the process, it will require a major change in the process as a whole and a rethink of the strategy that is currently used for meeting customer satisfaction on warranty claims. Due to the complexity related to the process, the GOODYEAR IMPROVEMENT WHEEL by Norbert Majerus gives the VSM a purpose to reach *operational excellence* by continuous improvement.

According to my understanding of the claims process, the mission is clear:

- To deliver a fast and accurate resolution
 - To collect quality field data for product improvements
 - To contribute to cost efficiency throughout the whole product value stream.
- Norbert Majerus [6] speaks about R&D in the following terms:

"We need to remember here that R&D is one piece of the value stream, and it must align with other stakeholders and the corporation."

If this is true for R&D it should also be true for the aftermarket processes.

One principle that is used in R&D at GOODYEAR, is to handle project ideas as patients. When an incoming patient requires assistance from the doctor, the patient expects to be treated as fast as possible. It is also in the doctors' interest to make a quick assessment since "the longer you keep the patient in therapy, the bigger the investment and eventually, the insurance company will not be willing to pay" [41]. Similarly, this principle can be applied to claims processing to see customers as patients expecting a quick assessment to avoid any increases in costs. Hence [41],

- Assess patients quickly and systematically
- Pursue what works and reassess quickly
- Discharge quickly

And to ensure high levels of data quality, I would add:

- Keep an accurate journal of the patient

Another challenge worth to mention, is to arrange a three-day workshop in which top management is involved. Therefore, combining VSM to visualize the process with an A3 which is widely used at GOODYEAR resulted in a very powerful communication package to catch the attention of top management in order to take action to continuously improve. It was also challenging to try to keep the composure and not to fall for the temptation of looking into all possible micro-level details of the value stream. There was a constant feeling of losing important details that can be crucial to find solutions for the future state. It might be true for VSMs in manufacturing environments, but since there exists an endless number of factors that can contribute to variation in administrative processes, I can only confirm what Karen Martin recommends; "do not go into the weeds". On the other hand, I found it beneficial to take a dive into details as it gave me very good insight into the experiences of the people working in the process.

The rules of engagement were well agreed before starting the current state workshop, but although we reached consensus, the rules did not have an effect. Especially when it came to "rank". Much of the information was first filtered by the person with the highest rank and since Jeff, the main facilitator was not on site, it was very hard for him to see and read the dynamics of the group. Karen Martin and many other experts in VSM strongly recommend getting everyone in the same room for the workshops. Now I see what they mean by that. It is imperative that a key person such as the facilitator is physically present during the workshops since it otherwise is very difficult to perceive the team dynamics.

Karen Martin [34] highlights the importance of getting the right team for the mapping activity and she also highlights the difficulties related to this. Managers are busy and that is a reality. Especially while activities cover such a big area as the EMEA region. Despite this, as a master student I received plenty of support from managers while carrying out my investigation. Much of the time consisted of exploring and learning about the company's structure and culture, and whether if findings

that could have been identified as waste in Lean terms, actually were symptoms telling me to dig deeper to find the root-causes outside the value stream.

Finally, while it is a meaningful and insightful metric to detect wasteful steps in the process, the Percentage Complete and Accurate (%C&A) is often a very difficult metric to obtain. Processes are set up with the final output in mind, hence deviations are felt but not objectively measured. Furthermore, as most but not all the functions were present during the workshops, %C&A data was exposed to subjectivity. Given the time-frame and scope of this investigation and our need to move forward with the elimination of more obvious forms of waste towards the creation of flow, we decided reluctantly to not pursue %C&A as a metric in this project.

6.1 Conclusions

The Value Stream Mapping as a lean tool delivered what it promised. It helped to view the value stream from a high-level perspective which made it possible to visualize how the work flows and to reveal “hidden” processes such as sales representatives’ involvement and the printing process of claim resolution. It also provided the information necessary to base decisions for a future strategy on facts. Consensus on the objectives of this improvement effort has been up to discussion in this paper. Nevertheless, the VSM helped to create consensus in respect to the problems that are affecting the value stream performance which gives pace to the organization to rethink the overall strategy to both meet customers’ expectations and improve how marketplace data has been retrieved. Finally, as mentioned before, the VSM helped to avoid the proposition of sub-optimized solutions.

Research Questions

RQ1: How is the CHP carried out in the different studied countries?

Although the formulation of this question was very beneficial to allow me to get familiar with the process before starting with the VSM planning, it also threw me numerous times into the weeds. One particular area where more clarity is needed is the customer/consumer interaction. Since the aftermarket processes are based on the B2B business model, it is also very easy to lose visualization of the consumer, a key player and the one who actually buys the products. Another area is the relationship customer/TCS. As stated before, it can represent plenty of challenges to the TCSM due to the dynamics of customer demands.

RQ2: What are the KPIs used in each site to measure performance?

The interviews and VSM workshops revealed different ways to measure performance across countries. Under those circumstances, it is pertinent to suggest an evident linkage to the different levels of value stream visibility.

In general, transportation is the main factor affecting the performance in all countries. Since the levels of visibility of logistics differ from country to country, there are no standard mechanisms that would allow TCSs to oversee the internal procedures and performance of logistics partners. It was found that claim cases are quickly processed by TCSs and thus, their processes cannot be a factor that would have a significant impact on the overall current state performance.

In particular for country A. Although transportation has been identified as waste, there is no evidence to suggest that the transportation distances are affecting the lead time. For instance, country A used to have an own AC which operations were later relocated to another country. During the early stages of this major change, lead times were strongly affected. Eventually, due to the close cooperation between the TCSM and the logistics partner, the transportation process started to stabilize and lead times dropped to the levels prior to the relocation.

During the first stages of this study, it seemed impossible to shorten the lead time since the current process was so well-established with the logistic processes. In addition, TCSMs are continuously working to improve internal practices. When I asked the question “to what extent is it reasonable to shorten the lead time? , I often got the answer “as short as possible”. The VSM helped to estimate what “as short as possible” could be, and there is a potential to shorten it from days to less than an hour.

RQ3: What are the current value- and non-value added activities at each site?

This question has been answered due to the results thrown by the VSM. The intent was to assess the current situation of each country in detail. Due to the time constraint, it was not impossible to do so. On the other hand, although there exists variation in local practices, the core process is the same. By studying the value stream in one country it was possible to find the common value-added and non value-added activities and as a consequence, the findings can be generalized to most cases in the EMEA region. Nevertheless, as a result of the interviews, the processes of each studied country were mapped in a value stream format (without formal workshops). This was done for the purpose of providing a communication tool to internally discuss the different approaches, and thus, adapt the future strategy to the individual marketplace.

RQ4: What is the most appropriate action plan to streamline the CHP throughout the EMEA region?

At the beginning of the project, it was the intent to create an implementation plan once the gaps were identified. As the gaps became visible as a result of the VSM workshops, they highlighted gaps outside of the system itself, such as role definitions, ownership of systems and other organizational aspects that are being part of internal revision. By looking at the reality of the value stream presented by the current state, it has triggered actions to rethink the strategy of the aftermarket processes.

6.2 Recommendations

As previously discussed, there is a need for consensus on the purpose of the system and a deeper understanding of the value to be delivered throughout the whole value stream. To achieve this, it is recommended to implement a Strategy Deployment to ensure that actions at all levels of the company are based upon strategic goals that make sense for everyone. Thus, communication and waste identification become more efficient as functions strive to achieve common objectives. In addition, it will help to coordinate actions and streamline the three levels of interaction depicted in figure 4.4. As the purpose is defined, roles and ownership of both systems and processes, in combination with Lean training will help to support continuous improvement efforts.

Since the dynamics of the relationship between sales and customer in the different countries has not been fully understood, and with it the best practices that are surrounding the claims process, it is recommended to strengthen the links to enhance cooperation with sales to reduce variation on how customers experience the process.

VSM in combination with A3 has proved to be very effective for problem-solving, therefore it can be recommended to be implemented in the different countries as a way to assess value stream performance, identify waste, and communicate improvement measures. Not to mention, the use of a such structured methodologies will contribute to strategic thinking bringing benefits to the whole value stream.

The findings indicate that information deteriorates over time. Therefore, it is recommended to assess the future state strategy as a potential redesign. Shortening the lead times will both help to ensure customer satisfaction and to close the gap that is affecting quality of marketplace data. Furthermore, the role of logistics in the current process is to transport the claimed tires to an Adjustment Center to physically assess the their condition. One way to eliminate this process is to redesign customer interface by taking advantage of existing digital technology solutions. This will certainly contribute to achieving an *easier, faster, better and cheaper* process. Norbert Majerus [6] highlights in his book a quote from Rich Kramer, Chairman, President and Chief Executive Officer of The Goodyear Tire & Rubber Company:

" Reinventing the fundamentals of our business [...] from region to region and business to business is inefficient [...]. Our customers won't pay for inefficiency, and today's advancements in communication and technology leave no reason or room to duplicate or reinvent. Driving toward standard work and process will eliminate wasted time, effort, and resources. It will also enable us to be more efficient from global perspective, as best practices can be easily shared in all regions if they are applied in 'One Goodyear Way' "

The design process of the future customer interface is critical to the levels of success

of the future state strategy. It implies major changes in the supply chain which require resources and coordination of the different functions. For this reason, it is recommended to put a greater emphasis on the translation of both external and internal customers' needs into the technical capabilities of the new interface.

6.3 Future Work

The dynamics of the interaction between sales representatives and customers have not been fully understood during this work. This interaction has been a factor of variation in the process and hence, it is necessary to understand the needs of sales representatives on the different marketplaces across the region in order to find solutions to minimize variability in the process. Gemba walks and interviews can give valuable information to investigating the best practices across the region.

6.4 Contribution

The findings of this work helped to identify the gaps that stand between the importance and richness of marketplace data that is needed to perform accurate analyses of field performance. They also helped to identify the need for a common purpose among the different functions to gain meaningful results that are focused on the customers' need. The VSM contributes to a common language when speaking about "the process" in where problems can quickly be identified and addressed.

This case study presented the application and efficiency of Value Stream Mapping in non-manufacturing environments. In addition, the study suggests a valid and reliable methodology to adapt VSM to the company's best practices on Lean and how it can be utilized in global environments. In this case, the Lean implementation model GOODYEAR IMPROVEMENT WHEEL gives the VSM a framework and a roadmap to channel and coordinate GOODYEAR's improvement efforts. Further, this work helped to create awareness at all levels within the company about the opportunities and challenges ahead resulting in the initiation of action plans to achieve a pull system.

As for academicians and Lean practitioners, it was the intent to share practical and real experiences on the application of Lean tools in non-manufacturing and global environments.

Final Words

As previously stated, this was an exploratory approach to VSM. From the lessons learned outlined in this paper, I hope to have contributed with experiences that can be of use when spreading this methodology to other areas within the company.

Bibliography

- [1] Global Presence | Goodyear Corporate. (2017). Corporate.goodyear.com. Retrieved 29 May 2017, from <https://corporate.goodyear.com/en-US/about/global.html>
- [2] Corporate.goodyear.com. (2015). Goodyear Establishes Tire Development Center in China. [online] Available at: <https://corporate.goodyear.com/en-US/media/news/Goodyear-Establishes-Tire-Development-Center-in-China.html> [Accessed 6 Jun. 2017].
- [3] Goodyear (2017). Welcome to Goodyear in Luxembourg, - A Guide for Interns. Luxembourg.
- [4] Staff, I. (2017). Business To Business - B To B. Investopedia. Retrieved 11 June 2017, from <http://www.investopedia.com/terms/b/btob.asp>
- [5] What is claims processing? definition and meaning. (2017). BusinessDictionary.com. Retrieved 16 August 2017, from <http://www.businessdictionary.com/definition/claims-processing.html>
- [6] Majerus, N. (2016). Lean driven innovation - Powering product Development At The Goodyear Tire & Rubber Company. 1st ed. CRC Press - Taylor & Francis Group.
- [7] Lean-Driven Innovation. (2016). Shingo.org. Retrieved 14 July 2017, from http://www.shingo.org/pr/pr_norbert-majerus_research.html
- [8] Lynch, D. (2014) Quality Engineering Applications and Research "Value Stream vs. Process Improvement". SKF, Paper 2014-2199, September 2014.
- [9] Chiarini, A. (2013). Lean Organization: from the Tools of the Toyota Production System to Lean Office. 1st ed. Milano: Springer Milan, p.1.
- [10] Baudin, M. (2013). Where do "Value Stream Maps" come from?. Michel Baudin's Blog. Retrieved 14 June 2017, from <http://michelbaudin.com/2013/10/25/where-do-value-stream-maps-come-from/>
- [11] Rother, M., Shook, J., Womack, J. and Jones, D. (2009). Learning to see. 1st ed. Cambridge (Mass.): The Lean Enterprise Institute.
- [12] Mathews, J. (2017). A3 -Managing to Learn - Introduction. Presentation, Goodyear Innovation Center - Luxembourg.
- [13] Shook, J. (2010). Managing to learn (1st ed.). Cambridge, MA: Lean Enterprise Institute.

-
- [14] Grainer, M., Noble, C., Bitner, M., & Broetzmann, S. (2014). What Unhappy Customers Want. MIT Sloan Management Review. Retrieved 1 June 2017, from <http://sloanreview.mit.edu/article/what-unhappy-customers-want/>
 - [15] Smalley, A. (2009). TPS versus Lean and the Law of Unintended Consequences. www.lean.org. Retrieved 12 June 2017, from <https://www.lean.org/Search/Documents/359.pdf>
 - [16] Knoeppel, C. (1917). Installing Efficiency Methods (1st ed., pp. 44-45). New York: The Engineering Magazine.
 - [17] Liker, J., & Convis, G. (2017). Using A3 Problem Solving to Make the Thinking Process Visible | Lean Enterprise Institute. [Lean.org](http://www.lean.org). Retrieved 31 May 2017, from <https://www.lean.org/common/display/?o=1973>
 - [18] What is Lean?. (2017). [Lean.org](http://www.lean.org). Retrieved 3 June 2017, from <https://www.lean.org/WhatsLean/>
 - [19] What is ERP - Enterprise Resource Planning? Webopedia. (2017). [Webopedia.com](http://www.webopedia.com). Retrieved 13 June 2017, from <http://www.webopedia.com/TERM/E/ERP.html>
 - [20] Bhuiyan, N. & Baghel, A. (2005). An overview of continuous improvement: from the past to the present. *Management Decision*, 43(5), 761-771. <http://dx.doi.org/10.1108/00251740510597761>
 - [21] XMind: The Most Popular Mind Mapping Software on The Planet.. XMind. Retrieved 13 June 2017, from <http://www.xmind.net/>
 - [22] Slack, N. & Lewis, M. (2015). *Operations strategy*. 1st ed. Harlow: Pearson.
 - [23] Rother, M., & Harris, R. (2001). *Creating continuous flow : an action guide for managers, engineers and production associates* (p. 9). Brookline: Lean Enterprise Institute.
 - [24] Sugimori, Y., Kusunoki, K., Cho, F., & Uchikawa, S. (2007). Toyota production system and Kanban system Materialization of just-in-time and respect-for-human system. *International Journal of Production Research*, 15(6), 553-564. <http://dx.doi.org/10.1080/00207547708943149>
 - [25] Gaury, E., Ierreal, H., & Kleijnen, J. (2000). An evolutionary approach to select a pull system among Kanban, Conwip and Hybrid. *Journal Of Intelligent Manufacturing*, (11), 157-167. <https://doi.org/10.1023/A:1008938816257>
 - [26] Shingo, S. (1988). *Non-Stock Production: The Shingo System of Continuous Improvement* (p. 393). Portland, Oregon: Productivity Press.
 - [27] [Lean.org Knowledge Center](http://www.lean.org). (2017). [Lean.org](http://www.lean.org). Retrieved 3 June 2017, from <https://www.lean.org/search/?sc=just+in+time>
 - [28] Dettmer, H. (1999). *Breaking the constraints to world-class performance*. 1st ed. Milwaukee, Wis.: ASQ Quality.
 - [29] Siesfeld, T. Cefola, J. Nee, D. (1998). *The Economic Impact of Knowledge*. Elsevier Inc.

- [30] Chowdhary, M. Constraint Management: Throughput, Operating Expense and Inventory. Global India Publications Pvt LTD. New Dehli.
- [31] Keyte, B., & Locher, D. (2004). The complete lean enterprise (1st ed., p. 24). New York: Productivity Press.
- [32] Bergman, B., & Klefsjo, B. (2014). Quality from customer needs to customer satisfaction (3rd ed., p. 318). Lund: Studentlitteratur AB.
- [33] Diener, E & Crandall, R. (1978). Ethics in Social and Behavioral Research. 1st ed. Chicago [etc.]: University of Chicago Press.
- [34] Martin, K. (2013). Value Stream Mapping: How to Visualize Work and Align Leadership for Organizational Transformation. McGraw-Hill Education. Kindle Edition.
- [35] Stalk, G., & Hout, T. (1990). Competing Against Time: How Time-Based Competition is Reshaping Global Markets. New York: Free Press.
- [36] Mason-Jones, R., & Towill, D. (1997). Information enrichment: designing the supply chain for competitive advantage. Supply Chain Management: An International Journal, 2(4), 137-148. <http://dx.doi.org/10.1108/13598549710191304>
- [37] Bryman, A. & Bell E. (2015). Business Research Methods. 1st ed. Oxford (UK): Oxford University Press, 2015. Print.
- [38] Tapping, D., & Shuker, T. (2008). Value stream management for the lean office (1st ed.). New York: Productivity Press.
- [39] Marchwinski, C., & Shook, J. (2014). Lean Lexicon: A Graphical Glossary for Lean Thinkers (5th ed.). Lean Enterprise Institute, Inc.
- [40] Keyte, Beau & Locher, Drew A.. (2016). The Complete Lean Enterprise: value stream mapping for office and services, second edition.
- [41] The Goodyear Tire & Rubber Company. (2015). Norbert Majerus - Successful Innovation Based on Lean Product Development. Retrieved from <https://vimeo.com/124103778>
- [42] Hinnerk Spegel (2017, pers. comm.) - Technical Customer Service Manager, Goodyear Dunlop Tires, Germany, GmbH
- [43] Jeff Mathews (2017, pers. comm.) - R&D Lean Operations, Six Sigma MBB. Goodyear Innovation Center Luxembourg, Luxembourg.

A

Appendix 1

Value Stream Mapping Charter				
Scope		Accountable Parties		Logistics
Value Stream	Claim Handling Process	Executive Sponsor	Jean-Claude Van Craen	Dates & Time
Specific Conditions	Consumer & Commercial - Submitted by Customer/Sales - Warrantable/non warrantable	Value Stream Champion		WS1: April 10th 2017 09:00 - 13:00 WS2: April 13th 2017 09:00 - 13:00 WS3: April 26th 2017 10:00 - 15:00
Demand Rate	/business day	Facilitator	Cristian Muñoz / Jeffrey Mathews	Location
Trigger	Enter claim	Briefing Attendees	** required * optional	Briefing dates and Times
First Step	Send collection note			
Last Step	Send rejection letter or credit note			
Boundaries & Limitations	• Replace system (yes to modify) • GY associate decides on warranty • Warranty policy • GY tire ownership if credit			
Improvement Time Frame	From May 2017 until October 2017 (within 6 months)			
Current Problems and Business Needs		Mapping Team		
*Better quality of data for analysis on performance *Process transparency to ensure appropriate improvement measures *Short response to increase customer satisfaction *Identify waste in activities so that to improve TCSs daily work *Stabilize and align the process throughout the EMEA region *Cross-functional cooperation		Function	Name	Contact Information
		1 TCSM		@goodyear.com
		2 RDEQ Lean Operations	Jeffrey Mathews (JM)	jmathews@goodyear.com
		3 GCPP Intern	Cristian Muñoz (CM)	c_munoz@goodyear.com
		4 TCSM		@goodyear.com
		5 Sales Retail		@goodyear.com
		6 Logistics		
		7		
		8		
		9		
10				
Measurable Target Condition		On-Call Support		
1 Reduce lead time (LT) from 2 Reduce process time (PT) from 3 % Complete & Accurate (%CAC) (provides confidence on data) 4 Rolled First Pass Yield (RFPY) 5 %ACT (activity ratio)		Function	Name	Contact Information
		1 RDEQ Lead Engineer GCPP	Julien Caroux (JC)	Julien_caroux@goodyear.com
		2		
		3		
		4		
Benefits to Customer and Business		Agreement		
*Fast and trustworthy response on customer claim *Confidence on analysis data for improvement of products *Confidence on performance indicators *Reduce stress and improve working relationships *More time for improvement efforts & technical tasks for the TCSM *Baseline for strategic decision making		Executive Sponsor	Value Stream Champion	Facilitator
		Date:	Date:	Date:
		Signature:	Signature:	Signature:
Relevant Data				
Staff, numbers of claims per day, kind of product sold, Number of GY partners (Dealership), Logistic partner's leadtime				

Figure A.1: Value Stream Mapping Charter

As described in section 3.1.2.2, the VSM charter provides a specific plan to perform the mapping activities. Figure A.1 depicts the charter used to perform the mapping activities in Country A.

B

Appendix 2 - Planning Report

The following document is the Planning Report that was made prior to the investigation.



CHALMERS
UNIVERSITY OF TECHNOLOGY

Planning Report

Application of Value Stream Mapping on The Goodyear
Aftermarket Customer Satisfaction Process in Europe, Middle
East, and Africa (EMEA)

Luxembourg, February 2017

Cristian Muñoz G.

Department of Product and Production Development
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2017

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1

Introduction

1.1 Background

In 1898, Frank Seiberling founded The Goodyear Tire Rubber Company in Akron, U.S.A. The production consisted in the manufacturing of bicycle and carriage tires, becoming soon the world's largest tire company. Goodyear employs today approximately 66000 people in 22 countries, having the headquarters in Akron, Ohio. Goodyear operations are divided into 3 regions around the globe; Americas, Asia Pacific and Europe, Middle East, and Africa (EMEA). Goodyear EMEA involves 20000 associates from 50 different nationalities, and supply 32 countries with 16 factories and one RD Center (GIC*L). Goodyear Innovation Center Luxembourg (GIC*L) has its focus on research and development of products for passenger- and heavy goods vehicles [1]. One key contributor for developing high-quality products is the feedback that can be obtained from field performance. The Government Compliance Product Performance (GCPP) department at GIC*L is responsible for ensuring customer satisfaction through professionally managed analysis of product field performance and for understanding government and industry standards, coordinate compliance, among others. The claimed conditions of the tires provide valuable information to product analysts about the performance of Goodyear products on the local market.

Product performance of tires in the field is evaluated based on feedback on Warranty claims data among others. The quality of the information collected throughout the claims treatment process is key to trigger appropriate actions. While a standard process to handle customer dissatisfaction across EMEA region has been defined in the past, the current challenge is to ensure full compatibility with local regulations and the evolving nature of the operation including specifications of local business needs, as well as capabilities constraints.

Customer claims are assessed through the claims Handling Process (CHP) that extends from the moment the customer submit a complaint until he/she receives a final decision from the company on whether the condition of the product is warrantable or not. Since the EMEA region covers a big number of countries, several factors that can contribute to the variation of the CHP, such as culture, local regulations, local markets, and practices.

1.1.1 Aim

The aim of this project is to bring to light how the claims Handling Process is managed throughout the different countries comprising the EMEA region. This requires analysis of both the data information flow and the tire flow. The findings will be documented to be used by a large group of Goodyear associates. The project will be based on the identification of gaps in the current process in order to propose an idealized version in combination with the definition of action plans to address the gaps. This could include, but not limited to metrics definition, roles and responsibilities definition, communication strategy and training. The methodology used during this work must be replicable in all details to be considered valid and to continue developing the improvement efforts in the future.

1.2 Delimitation

Since the master thesis work will be performed during a 20-weeks period, the scope of the investigation will be narrowed to cover a limited amount of countries. Poland, Germany, Italy, Nordics, Middle East and Benelux region covering product/information flow during the claims handling process. The products to be investigated are consumer, motorcycle and commercial tires.

Claims processes that will *not* form part of the investigation are:

- Original Equipment Manufacturer (OEM) claims
- OTR (Off-The-Road) tires and Motor sport
- claims that are expressed through social media and forums

1.3 Research Questions

1.3.1 Research Question 1

Quality of the data and the prompt response to customer demands are essential to both delivering high-quality products and ensure customer satisfaction. To support this endeavor, GCPP counts with TCSMs, ICs and distributors (Dealers) throughout the EMEA region. The aftersales activities, including the CHP, provide vital information on the performance of products, and since distributors and sales are in the front line of customer contact, they play also a very important role not only in the levels of customer satisfaction but also in the quality of data forwarded to product analysts. Although there is a standard procedure to handle the CHP, there are still factors that are obstructing the agility of the process. Therefore, it is necessary to first understand the different practices and the reasons behind those. Hence, the first research question is:

How is the CHP carried out in the different studied countries?

- How have standard procedures changed over time due to local market circumstances?
- What are the communication channels?
- How is the interaction between Customer-Dealer, Dealer-TCSM, and TCSM-AC?
- Which are the criteria used to enter the data describing the condition?
- In which way do the different players influence the CHP?

1.3.2 Research Question 2

KPIs are directly related to the levels of customer satisfaction. Although there exist tools for statistical analysis available for each region to assess performance, TCSMs, ICs and Dealers are accountable for their own internal process performance.

What are the KPIs used in each site to measure performance?

- How is performance measured?
- Are the shipping distances of tires to ICs affecting lead time?, why?
- What are the factors influencing the variation of the Lead time?
- To what extent is it realistic to shorten this lead time?

1.3.3 Research Question 3

Since the main objective of the project is to streamline the CHP, it is necessary to first identify waste- and value activities performed at each site. After getting a better understanding of the process, it will be possible to assess and identify possible causes to the interference of the process.

What are the current value and non-value adding activities at each site?**1.3.4 Research Question 4**

Once the problems are visible and identified, it is essential to propose an action plan based on the information gathered during the interviews and workshops and the ideal future state aimed to eliminate waste in the process.

What is the most appropriate action plan to streamline the CHP throughout EMEA? What, How, Who, Where, When.

2

Methods

The information for the assessment of the CHP will be gathered through a combination of action and qualitative research approach. The CHP needs to be mapped in order to identify the key aspects that differentiate the process in each country. For the action research, the Value Stream Mapping (VSM) is considered a suitable tool to contribute to this process. In order to achieve satisfactory results, visits will be needed in combination with the active participation of the interviewees so that to ensure the results of the VSM reflect the reality of how each site manage the CHP. The goal with the VSM sessions are to evaluate the present state, identify non-value-adding activities and propose a future state for the process.

The visits will be carried out on ICs, Tire dealer, Regional Technical Customer Manager and Back office. Since it will not be possible to visit all the countries stipulated in the scope, interviews will be performed by virtual communication channels. The development of the methodology is depicted in figure 2.1. During the action plan phase, the improvement proposals in form of future state given by the VSM will be compiled and documented for the final report.

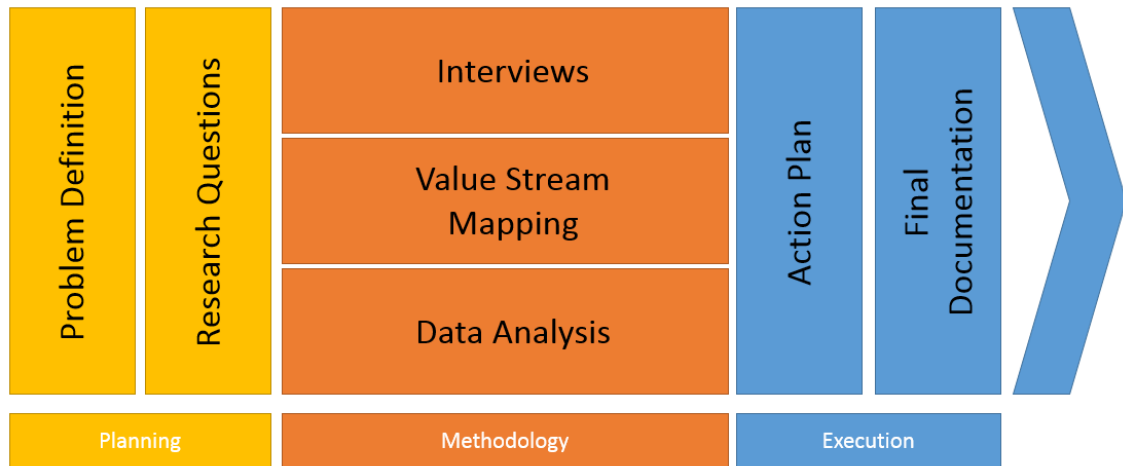


Figure 2.1: Research approach for the study

2.1 Ethical Considerations

Ethical considerations will be taken as a high priority while performing interviews in order to ensure credibility and accuracy of results. These considerations will be based upon the FOUR ETHICAL PRINCIPLES by Diener & Crandall [2]. They are:

1. **Harm**

Ensure that respondents are in no way directly harmed or adversely affected.

2. **Lack of informed consent**

Be given as much information as might be needed to make an informed decision about whether or not to participate in a study.

3. **Invasion of privacy**

Not to intrude on a respondent's privacy nor abandon normal respect for individual's value.

4. **Deception**

Not represent the research as something other than what it is.

2.2 Time Plan

In order to keep track of progress and coordinate activities with stakeholders such as supervisors, interviewees, institutions and the author, the plan depicted below has been developed.

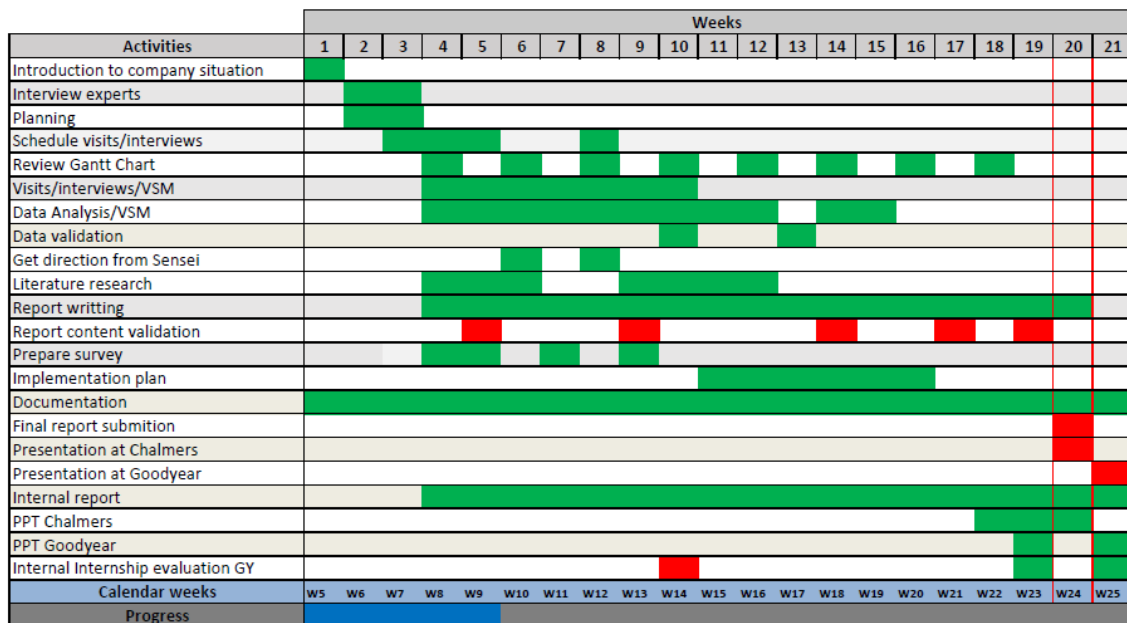


Figure 2.2: Time plan

Bibliography

- [1] Goodyear (2017). Welcome to Goodyear in Luxembourg, - A Guide for Interns. (pp.4-5). Luxembourg.
- [2] Diener, E & Crandall, R. (1978). Ethics in Social and Behavioral Research. 1st ed. Chicago [etc.]: University of Chicago Press

