Business Process Reengineering within the bicycle industry

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Author: David Bartolomé Rodríguez
Supervisor: Ove Bayard
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Abstract

Bicycle leader brands have shifted production overseas to reduce the cost of labor and to implement new technologies at lower cost. Bike manufacturers both in Asia and Europe employ a traditional way of production based on economics of scale that aims cost per unit reduction. Where MRP systems and forecasting are part of their day basis operations.

This traditional way of operation offers room for innovation that must be seen as a business opportunity. Thus, alternative management approaches can strengthen strategic goals and improve responsiveness and flexibility. Bicycle brands producing locally should implement alternative management systems to remain competitive, to take the maximum advantage of their location, to improve customer service and to cut operational cost.

The course of action followed was a market analysis to understand the nature of the bicycle market within European Union. Similarly, a Business Process Reengineering was conducted to identify with the current operational processes and opportunities within the bicycle industry. Based on the Business Process Engineering, an alternative business model was presented.

The main proposed solution to improve the current operational processes:
(a) Implementation of Just-in-time management system and relocation of assembly facilities.
(b) Benchmark IKEA core methods, designing products for supply chain and that customer assemble the furniture themselves.
(c) Benchmark Dell Computer business model of customization and supply chain.

Finally, the fundamentals for an alternative business concept were established regarding bicycle design concept, strategy planning and production system design.

Keywords: Just-in-time (JIT), Material Requirement Planning (MRP), Original Equipment Manufacturer (OEM), Lean principal
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David Bartolomé
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1 Introduction

This chapter gives an introduction to the thesis including background, problem statement, and objective. Finally the disposition of the thesis will be described.

1.0 Background

The usage of bicycles has increased in Europe in the past years as a consequence of the high price of oil, environmental initiatives, or healthiest lifestyles. Governmental initiatives have been also taken by some European countries to encourage bike commuting and support these initiatives. Without a doubt the European market of bicycles is on good shape and its reputed prosperity could be seem as a business opportunity.

The market of bicycle in Europe is really competitive due to the great number of bike brands operating in it. Moreover, Asian bike exports represent 40% of the EU market and Asian Bike Manufacturers have turn out to be very competitive in the past decade due to its low labor cost and its flexibility adapting edge technologies. Hence, bike leader manufacturers have moved overseas, specially to Taiwan and China, to take advantage of their evolving bicycle industries.

Relocating facilities overseas have brought substantial benefits to bike manufacturers although; there are numerous downsides when production is moved to Asia. Lead-time is longer and logistics cost is higher. Then, production must be based on forecast and high volumes and consequently high inventories must be hold. The distance makes them inflexible and less responsive to market changes. Moreover, product made overseas tend to have fewer acceptances because they do not benefit the European labor market and its economy.

The main advantage of European bike manufacturers is their location. Companies producing locally are supposed to provide better customer service, to be more responsiveness and to have more flexibility. Moreover products are entailed to be more environmental friendly and to have better quality due to EU industrial policies.

The downsides of producing overseas have to be seemed as a competitive advantage by European bike manufacturers. In order to survive small and middle size European bike manufacturers would have to redesign the core business process to cut operational cost and to improve customer service. They also must improve their responsiveness and flexibility, which are factors in today’s economy as important as price and quality.

Therefore, small and middle European bike manufacturers are required to reexamine their business processes to continue competitive within the bicycle market. Management philosophies like Lean or Just-in-time could help them to improve flexibility and responsiveness and support their privilege location.
1.1 Problem statement

Bicycle leader brands have shift production overseas, especially Taiwan and China, to reduce cost of labor and to implement new technologies and techniques at low cost. Moving overseas they have become more competitive because production cost has being reduced while quality standard and innovation were maintained. On the other hand, bicycle brands that manufacture in Europe are under pressure to continue competitive due to these circumstances.

Bike manufacturer both in Asia and Europe employ a traditional way of production based on economics of scale that aims cost per unit reduction. Where MRP systems and forecasting are part of their day basis operations. This traditional way of operation offers room for innovation and there lays the opportunity for European companies to remain competitive.

Small and middle size European bike manufacturers have to reengineer core business processes in order to remain competitive. Location is their main competitive advantage compare with overseas manufacturers. Then, current operation strategy has to be redesigned to better support strategic goals and customers needs. Alternative management approaches have also to be implemented to take the maximum advantage of their location, to improve customer service and to cut operational cost.

1.2 Aim and objectives

The project has three main objectives:

First one is to carry on a market study describing bike production, export and usage within the European Union. As well as relating the 10 best bicycle brands within the bike urban category and the customer.

Second aim consists of reengineering the business process of bike market leader brand. Evaluating the steps and procedures that they apply to transform resources in final products or services. Within the framework of this evaluation, reengineer and benchmark core business processes to improve customer service and to cut operations cost.

The third aim consists of proposing alternatives business model and establish its fundamentals regarding bicycle design concept, strategy planning and production system design.
1.3 **Disposition of the thesis**

**Chapter 1- Introduction**
This chapter will present mainstream of the study. It will include the purpose of this thesis as well as the background and the problem.

**Chapter 2- Theoretical framework**
This chapter aim to discuss the theories behind the problem.

**Chapter 3- Research Methodology**
This chapter presents the scientific approach, the methods and the data collection techniques used in the study. This gives the reader the necessary information to understand and evaluate the credibility of the results.

**Chapter 4- Bicycle Market Analysis**
This chapter set sights on the existing European bicycle market, competitor and customer.

**Chapter 5- Business Process within the bicycle industry**
This chapter describes the current business process of first-class bicycle brands and a Business Process Reengineering is carried out to transform the current operational processes within the supply chain.

**Chapter 6- To-Be process business alternative conception**
This chapter intends to present an alternative model and establish its fundaments.

**Chapter 8- Conclusion**
This chapter presents the main finding from the study in connection with the purpose of study. Beside, it draws conclusion regarding the research.

**Chapter 9- References**
This chapter cites all the literature used for this thesis.
2 Theoretical frameworks

This chapter aim to discuss the theories behind the problem.

2.0 Business process reengineering

In a world increasingly driven by the three Cs: Customer, Competition and Change, companies are on the lookout for new solutions for their business problems (Champy, 1993). Recently, some of the more successful business corporations in the world seem to have hit upon an incredible solution: Business Process Reengineering (BPR) (Subramanian Muthu, 1999).

BPR advocates that enterprises go back to the basics and reexamine their very roots. It doesn’t believe in small improvements. Rather it aims at total reinvention. As for results: BPR is clearly not for companies who want a 10% improvement. BPR is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service and speed (Champy, 1993).

BPR field reengineering should focus on processes and not be limited to thinking about the organizations, tasks, jobs or people. After all the organization is only as effective as its processes. (Champy, 1993). So, what is a process? “A business process is a series of steps designed to produce a product or a service. It includes all the activities that deliver particular results for a given customer (external or internal) (Mayer, 1998)”. Processes are currently invisible and unnamed because people think about the individual departments more often than the process with which all of them are involved (Champy, 1993).

No company can take up the unenviable task of reengineering all the processes simultaneously. Generally they make there choices based on three criteria: Dysfunction: which processes are functioning the worst? Importance: which are the most critical and influential in terms of customer satisfaction. Feasibility: which are the processes that are most likely to be successfully reengineered (Champy, 1993).

The Figure 1 provides a systematic approach or methodology to accomplish a BPR in five main activities: Prepare for reengineering, Map and Analyze As-Is process, Design To-be process, Implement reengineered process and Improve continuously.
**Activity 1- Prepare for Reengineering:**

Before attempting reengineering, the question ‘Is BPR necessary?’ should be asked? There should be a significant need for the process to be reengineered. The justification of this need marks the beginning of the Preparation activity. Planning and Preparation are vital factors for any activity or event to be successful, and reengineering is no exception (Mayer, 1998). Another important factor to be considered while establishing the strategic goals for the reengineering effort, is to make it your first priority to understand the expectations of your customers and where your existing process falls short of meeting those requirements. Having identified the customer driven objectives, the mission or vision statement is formulated. The vision is what a company believes it wants to achieve when it is done, and a well-defined vision will sustain a company’s resolve through the stress of the reengineering process (Champy, 1993).

**Activity 2- Map and Analyze As-Is Process:**

Before redesigning the processes, the existing process should be understood. This is initiated by first creation and documentation of Activity and Process models making use of the various modeling methods available. The main objective of this phase is to identify disconnects (anything that prevents the process from achieving desired results and in particular information transfer between organizations or people) and value adding processes (Mayer, 1998).

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**Figure 1: Business Process Engineering Activities (Mayer, 1998)**
Activity 3- Design To-Be process:

The objective of this phase is to produce one or more alternatives to the current situation, which satisfy the strategic goals of the enterprise. The first step in this phase is benchmarking. “Benchmarking is the comparing of both the performance of the organization’s processes and the way those processes are conducted with those relevant peer organizations to obtain ideas for improvement (Mangenelli, 1994).” Innovative practices can be adopted from anywhere, no matter what their source. Having identified the potential improvements to the existing processes, the development of the To-Be models is done using the various modeling methods available, bearing in mind the principles of process design. Then, similar to the As-Is model, we perform simulation and ABC to analyze factors like the time and cost involved. It should be noted that this activity is an iterative process and cannot be done overnight. The several To-Be models that are finally arrived at are validated. By performing Trade off Analysis the best possible To-Be scenarios are (Champy, 1993).

Activity 4- Implement Reengineered Process:

The implementation stage is where reengineering efforts meet the most resistance and hence it is by far the most difficult one. When so much time and effort is spent on analyzing the current processes, redesigning them and planning the migration, it would indeed be prudent to run a culture change program simultaneously with all the planning and preparation. This would enable the organization to undergo a much more facile transition. But whatever may be the juncture in time that the culture change program may be initiated; it should be rooted in our minds that winning the hearts and minds of everyone involved in the BPR effort is most vital for the success of the effort (Champy, 1993).

Once this has been done, the next step is to develop a transition plan from the As-Is to the redesigned process. This plan must align the organizational structure, information systems, and the business policies and procedures with the redesigned processes. “Rapid implementation of the information system that is required to support a reengineered business process is critical to the success of the BPR project. The IDEF models that were created in the As-Is can be mapped to those created during the To-Be and an initial list of change requirements generated. Additional requirements for the construction of the To-Be components can be added and the result organized into a Work Breakdown Structure (WBS). Using prototyping and simulation techniques would also be an excellent way to validate the redesigned process and to ease the acceptance of it.

Activity 5- Improve Process Continuously:

A process cannot be reengineered overnight. A very vital part in the success of every reengineering effort lies in improving the reengineered process continuously. The first step in this activity is monitoring. Two things have to be monitored – the progress of action and the results. The progress of action is measured by seeing how much more informed the people feel, how much more commitment the management shows and how well the change teams are accepted in the broader perspective of the organization. Continuous improvement (TQM) and BPR have always been considered mutually exclusive to
each other. But on the contrary, if performed simultaneously they would complement each other wonderfully well. In fact TQM can be used as a tool to handle the various problems encountered during the BPR effort and to continuously improve the process (Champy, 1993).

2.1 Supply chain management (SCM)

Supply chain management deals with the management of material, information and financial flows in a network consisting of suppliers, manufacturers, distributors, and customers. The supply chain may fit into the overall business strategy of the firm because; an important part of the firm competitive edge is its strategic positioning in the marketplace. Hence, the design of the supply chain also reflects a firm’s strategic positioning (Nahmias, 2005).

The manufacturing function has become very efficient in recent years. Firms have either established manufacturing as a core competency or outsourced it. For that reason, manufacturing generally does not provide an opportunity for significant cost reduction and there is where supply chain plays an important role. The firms that are able to move product quickly and efficiently will gain an edge over their competitors (Nahmias, 2005).

The goal of supply chain management is to eliminate the redundancy of activities and integrate the operations of the different organizations so that the entire process becomes more flexible to changes in customer demands and also reduce the total cost and time of the entire flow of the supply chain (Nahmias, 2005).

2.1.0 Designing products for supply chain efficiency

Product design was traditionally a function that was totally divorced from more mundane operations management issues. Designers would be concerned primarily with aesthetics and marketability. Little attention would be given to nuts-and-bolts concerns such as manufacturing and logistics at the design stage (Nahmias, 2005).

In recent years, firms have realized that the logistics of managing the supply chain can have as much impact on the bottom line as product design and manufacturing. More than ever, we are seeing innovative designs that take supply chain considerations into account. One way of describing this concept is design for logistics (DFL). Another is three-dimensions here are product, process, and supply chains (Nahmias, 2005).

Two significant ways that logistics considerations enter into the product design phase are:
1. Product designs for efficient for efficient transportation and shipment.
2. Postponement of final product configuration.

Products that can be packed, moved, and stored easily streamline both manufacturing and logistics. For instance, Swedish-based IKEA certainly did an excellent job of designing products that are modular and easily stored. Furniture is sold in simple-to-assemble kits that allow IKEA retailers to store furniture in the same warehouse like locations at which they are displayed.
2.1.1 Postponement in supply chains

One of the key findings from supply chain research in recent years is the value of postponing the configuration of the final product as long as possible. In 1972 Benetton undertook a unique postponement strategy: where clothes are knitted and then dye. One might well question this strategy since labor and production costs for garments dyed after manufacture are about 10 percent higher than for garments knitted from dyed thread (Nahmias, 2005).

The advantage of reversing the order of the dying and the knitting operations is that it provides additional time before committing to the final mix of colors. This time gives the firm a chance to gain additional data on consumer preferences for colors. First, if a specific color became more popular than anticipated, Benetton could meet the demand for that color. Second, the company would run less risk of having large unsold stockpiles of garments in unpopular colors (Nahmias, 2005).

2.1.2 Additional Issues in SCM

While products can be better designed for efficient supply chain operation, there are several important issues to consider in the design of the supply chain itself (Nahmias, 2005).

- Configuration of the Supplier Base
  The number of suppliers, their location, and their sizes are important considerations for efficient supply chain design. In recent years, the trend has been to reduce the number of suppliers and develop long-term arrangements with the existing suppliers base. The overseas suppliers were chosen primarily on a cost basis, while the local suppliers could provide more timely deliveries when necessary.

- Outsourcing Arrangements

  Outsourcing of manufacturing and supply chain functions has become a popular trend in recent years.

- Channels of Distribution

  Failure to establish solid channels of distribution can spell the end for many firms. The design of the distribution channel includes the number and the configuration of distribution centers; arrangement with third-party wholesalers; licensing and other agreements with retailers; including vendor-managed inventory programs, and establishment of the means to move product quickly through the channel. Direct selling to consumers has been an enormously successful strategy for some retailers, especially for products that become obsolete quickly. By eliminating intermediaries, manufacturers reduce the risk of product dying in the supply channel. This has been a successful strategy for computer Dell and Gateway and for the bookseller Amazon.com.
2.1.3 **SCM in a global environment**

The discussion so far has considered the motivations and problems that arise from international operations in general. Many of these issues also apply to managing the global supply chain. For example, exchange rates can play an important role in the design of the supply chain (Nahmias, 2005).

Geographic distances also present special problems for supply chain management. While we have learned to move information at light speed, the time required to move physical goods from one place to another has not changed appreciably in the past several decades. Locating facilities offshore means longer supply lead times. Procedural requirements, bureaucratic delays, and weather conditions are all factors that increase the uncertainty of lead times (Nahmias, 2005).

Lean production systems such as JIT become much harder to implement when facilities and suppliers are located far apart. Infrastructure inadequacies also present special problems for managing global supply chains. The list of problems includes lack of skilled workers, poor roads, lack of suitable airports, and undesirable living conditions for overseas management (Nahmias, 2005).

2.2 **Lean production concept: World Class Manufacturing**

World Class Manufacturing (WCM) is a joint name for efficient tools to improve productivity in the production. It includes other well-known tools such as Just In Time and Total Quality Management and mainly focuses on production (J.Lind, 2001).

Manufacturing was during a long time internally focused. The employees often minded their own function and had little understanding for other parts of the organization and did not realize their impact on the process as a whole. Earlier, the different functions such as purchasing, engineering, quality etc were strictly separated by a virtual wall, with hardly any connection between them, meaning one function could do what was best for them with no thought about how it affected the rest of the functions. The result of these walls was that the product suffered and failed to meet customer needs and expectations but also the organization suffered since this setup meant losses in time, money and opportunities (J.Lind, 2001).

As this setup was damaging organizations, a goal to implement a lean world-class enterprise was formed. It aimed to improve all aspects of business as a whole. World Class Manufacturing has two goals, first of all to improve the interactions between functions, departments or sectors. Secondly it should provide organizations with a toolbox to be able to compete and be responsive in a constantly changing business environment. WCM focuses on continuously improving the areas of delivery, safety, quality, operating cost and profit margins simultaneously, eliminating waste in the production system by providing sufficient tools throughout the organizational levels (J.Lind, 2001).
2.2.0 Lean manufacturing

Lean production, Just-In-Time (JIT), and zero inventories are all name for essentially the same thing: a system of moving material through a plant that requires a minimum of inventory. Two developments were key to the success of this new approach to mass production: the kanban system and SWED. Kanban is a Japanese word for car or ticket. It is a manual information system developed and used by Toyota for implementing JIT (Nahmias, 2005).

Two most prevalent types of kanban tickets are withdrawal kanbans and production ordering kanbans. A withdrawal kanban is a request for parts to a work center from the prior level of the system. A production ordering kanban is a signal for a work center to produce additional lots (Nahmias, 2005).

2.2.1 Lean principles

The Lean philosophy has some principles, which were derived from the original lean implementation, The Toyota Way (Liker, 2004), and from the Lean Toolbox a set of principles (Bicheno, 2009):

i. The starting point is to specify value from the point of view of the customer. This is an established marketing idea (that customers buy results, not products – a clean shirt, not a washing machine). Too often, however, manufacturers give the customers what is convenient for the manufacturer. Or deemed economic for the customer.

ii. Then identify the Value Stream. This is the sequence of processes all the way from raw material to final customer, or from product concept to final launch. If possible look at the whole supply chain. You are only as good as your weakest link, supply chains compete, not companies. Focus on the object, not the department, machine or process step. Think economies of time rather than economies of scale. Map and measure performance of the value stream end-to-end, not departmentally.

iii. The third principle is flow. Make value flow. If possible use one-piece or one-document flow. Keep it moving. Avoid batch and queue, or at least continuously reduce them and the obstacles in their way. Never delay a value-adding step by a non-value adding one. Flow requires much preparation activity. But the important thing is vision: have in mind a guiding strategy that will move you inexorably towards simple, slim and swift customer flow.

iv. Then comes Pull. Having set up the framework for flow, only operate as needed. Pull means short-term response to the customer’s rate of demand, and not over producing. Think about pull on two levels: on the macro level most organizations will have to push up to certain point and respond to final customer pull signal thereafter. On the micro level, respond to pull signals as, for instance, when additional staffs are needed at supermarket checkout to avoid excessive queues. Attention to both levels is necessary.
v. Finally comes perfection. Having worked through the previous principles, suddenly now "perfection" seems more possible. Perfection does not only mean defect free – it means delivering exactly what the customer wants, exactly when it wants, at a fair price and with minimum waste. Be aware of benchmarking – the real benchmark is zero waste.

### 2.2.2 Advantages and disadvantages of the JIT philosophy

JIT can be a useful tool in the right circumstances, but is far from a panacea for the problems facing industry today. JIT and Economic order quantity model (EOQ) are not mutually exclusive. Setup time and, consequently, setup cost reduction result in smaller lot size. Smaller lot sizes require increased efficiency and reliability of the production process, but considerably less investment in raw material, work-in-process inventories, and finished-goods inventories (Nahmias, 2005).

JIT works well when the overall production demand is stable and predictable. Changes in the demand may result from predictable causes or random fluctuations or both. Another potential shortcoming of JIT is the idle time that may result when unscheduled breakdowns occur. Part of the Japanese philosophy is that workers should have a familiarity with more than one portion of the production process (Nahmias, 2005).

Because items are moved through the system in small batches, 100 percent inspection is feasible. Seen in this light, JIT can be incorporated easily into an overall quality control strategy. Total quality management (TQM) and JIT can work together not only to reduce inventory costs, but also to bring about significant improvement in product quality (Nahmias, 2005).

Greater flexibility on the part of the suppliers is necessary; they must be able to react quickly and provide sufficiently reliable parts to relieve the manufacturer of the necessity to inspect all incoming lots. Thus, multiple sourcing becomes difficult under such a system and firm may be forced to deal with a single supplier in order to develop the close relationship that the system requires. Single sourcing presents risks for both suppliers and manufacturers. The manufacturer faces the risk that supplier will be unable to supply parts when they are needed, and the supplier faces the risk that the manufacturer will suffer reverses and demand will drop. JIT worked well only in favorable manufacturing environments where there is little or no demand variability, reliable vendors, and small setup times for production (Nahmias, 2005).

### 2.2.3 Lead Time

Lead time is defined as the total time required to complete one unit of a product or service (Larsson, 2001). By focusing on the time perspective an organization can benefit in many ways such as the product or service can be easier to sell, the organization gets a competitive advantage towards competitors giving the organization a larger market share (D.T, 2005). Also the organization would be less dependent of forecast and there would also be less "time" for forecasts to show errors. Finally, better quality can be achieved and the costs can
Measuring and analyzing lead-time often demands a certain amount of practical work. One example is time keeping, since most time estimations regard the individual functions or parts of the process. The required time for the entire process, sequences or non-value adding activities are often missing. Often when looking at lead-time it is good to start by investigating the non-value adding activities and waste that exists in the process. By determining the lead-time of the different processes or activities, the organization can rethink focus efforts on improving problem areas (Larsson, 2001).

2.3 **Total Quality Management (TQM)**

TQM is a management philosophy, a paradigm, and a continuous improvement approach to doing business through a new management model. The TQM philosophy evolved from the continuous improvement philosophy with a focus on *quality* as the main dimension of business. Under TQM, emphasizing the quality of the product or service predominates. TQM expands beyond statistical process control to embrace a wider scope of management activities of how we manage people and organizations by focusing on the entire process, not just simple measurements (Founda, 1996).

TQM is a comprehensive management system which:

- Focuses on meeting owners’/customers’ needs by providing quality services at a cost that provides value to the owners/customers
- Is driven by the quest for continuous improvement in all operations
- Recognizes that everyone in the organization has owners/customers who are either internal or external
- Views an organization as an internal system with a common aim rather than as individual departments acting to maximize their own performances
- Focuses on the *way* tasks are accomplished rather than simply *what* tasks are accomplished
- Emphasizes teamwork and a high level of participation by all employees

2.4 **Marketing – Building Global Brands**

The best way for a new brand to succeed is to act like an old brand. Most famous brands, rich in meaning and values, started out as the ordinary names of innovative products or services, different from those of competitors. These names were generally randomly chosen, without any prior study or analysis, for instance, Mercedes was the name of Mr. Daimler’s daughter (Kapferer, 2004).

Manufacturers make products; consumers buy brands. The conclusion of this quick overview is reassuring: to make a strong brand, any name can be used (or almost any), provided that there is a consistent effort over time to give meaning to this name (Kapferer, 2004).
From the very beginning, the new brand has to convey its values. It will be treated as a real brand and not as a mere product name. Both functional and non-functional characteristics must be well thought-out and categorize. The next points have to be considered before creating and launching the brand:

- Brand core activities
- Brand genuine performance
- Defined brand personality
- Brand set of values

Brand do not describe products, brands distinguish products. The founders of Apple were well aware of this: within a few weeks the market would know that Apple made microcomputers. It was therefore unnecessary to fall into the trap of names such as Microcomputers International or Computer Research Systems. The brand name therefore should not describe what the product does but reveal or suggest a difference (Kapferer, 2004).

It is important to choose a name without limit scope in space or time. Many names end up preventing the brand from developing naturally over time because they are too restrictive. For instance, Europ Assistance hinders the geographical extension. Any brand must be given the potential to become international in case it should want to become so one day. The brand name must be memorable and own able so generic names may be avoided. They are easy to copy and will trap the new brand within a specific area. The brand name must be able to stand the test of time, whatever the trend at any given moment. Choosing a name that defines a single product benefit too narrowly or too specifically may only be successful in a much smaller category. For instance, Kentucky Fried Chicken has spent tens of millions of dollars trying to move to the more general KFC as fried foods have lost some of their consumer appeal.

We live in an age of the 30-second television commercial or the 15-second television or radio, so the shorter the brand name, the better. However, there are many exceptions to this idea; for instance, Blackberry is a long name but very memorable due to its fast pronunciation (Calkins, 2005).

In terms of brand creation, there is only one simple lesson to be learnt from this: if the new brand does not convey its values from the very start, as soon as it is created and launched, it is quite unlikely that it will manage to become a major brand (Kapferer, 2004).

A successful launch requires that the new brand be treated as a real brand, right from the very start – not as a mere product name presented in advertising. From the very beginning, the new brand must be considered in full, for example endowing it with both functional and non-functional values (Kapferer, 2004).

In order to know if a brand is well defined and stand for its values and personality, the New Strategic Brand Management (Kapferer, 2004) proposes a questioner.
2.5 **Introduction to e-business and e-commerce**

*Electronic commerce (e-commerce)* is often thought simply to refer to buying and selling using the Internet; people immediately think of consumer retail purchases from companies such as Amazon. But e-commerce involves much more than electronically mediated financial transactions between organization and customers (Dave Chaffey, 2004). The UK government uses a broad definition:

*E-commerce is the exchange of information across electronic networks, at any stage in the supply chain, whether within an organization, between business, between businesses and consumers, or between the public and private sector, whether paid or unpaid. (Cabinet Office, 1999)*

When evaluating the impact of e-commerce on an organization, it is instructive to identify opportunities for buy-side and sell-side e-commerce transactions, since systems with different functionalities will need to be created in an organization to accommodate transactions with buyers and with suppliers. **Buy-side e-commerce** refers to transactions to procure resources needed by an organization to accommodate transactions with buyers and with suppliers. **Sell-side e-commerce** refers to transactions involved with selling products to an organization’s customers (Dave Chaffey, 2004).

*Electronic business (e-business)* is defined by IBM as “the transformation of key business processes through the use of Internet technologies”. The key business processes mentioned in the IBM definition refer, for instance, R&D, marketing, manufacturing, inbound and outbound logistics, buy-side and sell-side e-commerce. So e-commerce can be conceived as a subset of e-business.

**Table 1: Tangible and intangible benefits from E-business (Dave Chaffey, 2004)**

<table>
<thead>
<tr>
<th>Tangible benefits</th>
<th>Intangible benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increased sales from new sales leads giving rise to increased revenue from:</td>
<td>• Corporate image communication</td>
</tr>
<tr>
<td>New customers, new markets</td>
<td>• Enhancement of brand</td>
</tr>
<tr>
<td>Existing customers</td>
<td>• More rapid, more responsive marketing communication</td>
</tr>
<tr>
<td>• Marketing cost reductions from:</td>
<td>• Faster product development lifecycle enabling faster response to</td>
</tr>
<tr>
<td>Reduced time in customer service</td>
<td>market needs</td>
</tr>
<tr>
<td>Online sale</td>
<td>• Improved customer service</td>
</tr>
<tr>
<td>Reduced printing and distribution costs of marketing communications.</td>
<td>• Learning for the future</td>
</tr>
<tr>
<td>• Supply-chain cost reductions from:</td>
<td>• Meeting customer expectations to have a web site</td>
</tr>
<tr>
<td>Reduced levels of inventory</td>
<td>• Identifying new partners, supporting existing partners better.</td>
</tr>
<tr>
<td>Increased competition from suppliers</td>
<td>• Better management of marketing information and customer</td>
</tr>
<tr>
<td>Shorter cycle time in ordering</td>
<td>information.</td>
</tr>
<tr>
<td>• Administrative cost reductions from more efficient routine business processes</td>
<td>• Feedback from customers on</td>
</tr>
<tr>
<td>such as recruitment, invoice payment and holiday</td>
<td>products</td>
</tr>
</tbody>
</table>
The significance of e-commerce and e-business will vary between all business and organizations in terms of adoption by customers in their marketplace and the timing and amount of investment needed. In particular, as we have seen, adoption is likely to vary between business and consumers. For this reason it has become conventional to consider business-to-business (B2B) e-commerce and business-to-customer (B2C) commerce separately (Dave Chaffey, 2004).

2.5.0 Dimensions and determinants of service quality E-business

Performance is judged on another level in E-business due to the lack of interpersonal contact, so different standards are involved.

The research, carried out between 1982 and 1995, identified many different factors that customers can use to judge service quality during the service encounter. For the purposes of this discussion, the main determinants are assumed to come from Parasuraman et al. (1985), Johnston et al. (1990), Johnston and Silvestro (1990), Johnston (1995) and GroÈnroos (1990). Out of these 22 determinants, we consider that only 11 are of value to the assessment of Web site quality.

<table>
<thead>
<tr>
<th>Competence</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courtesy</td>
<td>Credibility</td>
</tr>
<tr>
<td>Cleanliness/tidiness</td>
<td>Security</td>
</tr>
<tr>
<td>Comfort</td>
<td>Reliability</td>
</tr>
<tr>
<td>friendliness</td>
<td>Appearance/aesthetics/color</td>
</tr>
<tr>
<td>Attentiveness/helpfulness</td>
<td>Availability</td>
</tr>
<tr>
<td>Care</td>
<td>Functionality</td>
</tr>
<tr>
<td>Commitment</td>
<td>Integrity</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Trustworthiness</td>
</tr>
<tr>
<td>Recovery</td>
<td>Professionalism and skills</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Attitudes and behavior</td>
</tr>
</tbody>
</table>

Two other determinants that are not relevant to Web site quality are flexibility and recovery. Flexibility refers to the ability of the employee to change the service or product to meet the needs of the customer. The Web site experience is based on generic processes that do not allow the service or products on offer to be changed. The only way this can be done is by personalizing a site for a customer, but this is based on specific customer data and only takes effect after a customer's first visit. The other non-relevant determinant is recovery.
The determinant can only be judged when the service or part of it goes wrong. If there is a problem with a Web site, it is highly likely that the customer will just click to a competitor and therefore the process of recovery cannot be started. Also, if there is a consistent problem accessing the Web site or while using it, then a customer should complain but they are more likely to click to another competitor's Web site rather than spend time complaining and therefore service recovery becomes if the problem occur offline, then recovery becomes much more important. It is therefore argued that recovery is not relevant to the Web site experience (Dale, 2001).

The remaining 11 determinants can be said to be important for both service quality and Web site quality, if not in exactly the same way.

As in services, accessibility is crucial for Web sites because of the concept of e-business whereby customers can browse the medium of the Internet on a continuous basis. If a Web site is too slow to download or unavailable for a significant amount of time; customers will probably not attempt to use that site again but click to a competitor. Just as crucial is the speed with which the home page downloads as well as the other pages to be navigated within the Web site. This is especially important because most customers use Web sites for speed and convenience (Dale, 2001).

Communication is another important factor for the Web site experience although it is provided using text, color, graphics and animation rather than by personnel. It is also a one-way communication channel, unlike in services where the customer and company employee can interact. Communication can also be used to describe service, feedback and customer confidence because of the link with informing and listening to the customer (Dale, 2001).

Credibility in Web site design usually refers to such factors as security, privacy, company details, and quality certification. The security determinant in services is still important during the Web site experience, perhaps even more so as it is one of the main barriers to customers making purchases online but it is seen as a part of reliability instead of a separate entity (Dale, 2001).

Reliability in services is determined as consistency of performance and dependability that is relevant to Web site design (Dale, 2001).

The determinant of understanding or knowing the customer is just as important in services as in e-business. Appearance/aesthetics/color is considered as an important factor of quality in that it serves to reflect the corporate image of the Web site and this is important for customers, giving them confidence in using the site. However, the use of flashy graphics and complicated animation can also discourage customers from using a site. Therefore the determinant of appearance is just as important in the Web site experience as in services (Dale, 2001).

Availability is also important because it concerns the ability of the Web site to inform the customer of stock information for products offered in real-time. It is important for the customers to know whether the product they are ordering is available now or out of stock (Dale, 2001).
**Functionality** in services refers to the serviceability or fitness for purpose of the service on offer. In terms of the Web site experience, this relates to clarity of purpose and ease of navigation (Dale, 2001).

**Integrity** refers to the trustworthiness of the company offering the service. In the Web site experience, integrity is interpreted as providing policies on privacy, security, terms and conditions and restrictions on who can use the Web site (Dale, 2001).

**Professionalism** and **attitude** will enhance customer loyalty and provoke increased positive word-of-mouth communication (Dale, 2001).

### 2.5.1 E-Business key points

Key points extracted from the article (Dale, 2001):

**Pros:**
- Speed is one of the main attractive for customers
- Customer loyalty is a key factor in gaining a competitive advantage over the competitor
- Can recognize returning customer by means of a simple registration of an e-mail.
- Customer retention.
- Moment of truth “customer service reached by email or phone”
- Keys e-commerce: accessibility and approachable
- The customer knows instantly whether a product is available or not
- Customer perceives that they have alternative suppliers from which to choose, and then their zone of tolerance is likely to be smaller.
- Many customer lack knowledge about Web site standards and are therefore likely to be less critical

**Cons:**
- High level integration
- Volume of users accessing
- Negative word-of-mouth appears to travel much faster in cyberspace.
- Web site is not easy to navigate a customer will probably never return to use it again.
- Downloading delays as the reason for not making a purchase.
- No human contact point of view (Most customer want to be served by the same contact person each time they visit their bank). “Personalize service through the web could be a good idea to overcome this lack of interpersonal contact”
- Lack of courtesy and competence
3 Research methodology

This chapter presents the scientific approach, the method and the data gathering techniques used in the study. This gives the person who reads the considered necessary information to comprehend and evaluate the credibility of the results.

3.0 Research approach

When performing research in the area of business, three ways to approach science can be identified. These are the analytical, the systems and the actors approach and they have different views on what reality is, how to approach reality and what results come of it. The following sections will describe these three ways and also the path we have chosen for this study (Bjerke, 1997).

The following sections will describe these three ways and also the path we have chosen for this study.

3.0.0 The analytical approach

Researchers claiming to agree with the analytical approach suggest that it is possible to describe the entire picture of a phenomenon by gathering information about all the individual parts of the whole. Therefore all problems can be broken down into smaller parts and the solutions of all the smaller problems can be put together to get the solution for the whole. In the analytical approach the result is always the same independently of who the observer is. The truth of a phenomenon is, according to the analytical approach, discovered by looking for causal relations between the smaller parts and verifying that these relations do not change when the circumstances change, for example when the phenomenon occurs in a different environment or when a different person views it. This approach aims to distinguish a difference between what is a subjective impression of a phenomenon and what are objective facts (Bjerke, 1997).

3.0.1 The systems approach

Like the analytical approach, the systems approach aims to give an objective view of what reality is. The main difference between the two approaches is that the systems approach does not see the whole as the sum of all its parts. The individual parts of the system are instead seen as mutually dependent of each other, making the relations and synergies between the different parts interesting to investigate. The entire system has to be understood to be able to predict changes occurring that affect the system. Therefore it is necessary to include investigation of all factors in the system when performing analysis with the systems approach (Bjerke, 1997).
3.0.2 **The actors approach**

The actors approach does not strive to give an objective picture of reality. Instead, reality is considered to be an effect of the mutual impact that the existing social structure and the actors in it have on one another. Individuals affect reality, and depending on the different experiences, interpretations and actions of these individuals, the starting point for reality is formed. This results in reality being a changing phenomenon as the actors within it change, have new experiences, interpret differently or act in new ways. The actors approach can be used when one aims to understand the reality by studying the different actors and social structures in it (Bjerke, 1997).

3.0.3 **Approach used in this thesis**

The purpose of this master thesis is to reengineer core business processes of bike manufacturers and propose a more groundbreaking model. These findings are to be presented in a business case format, covering investment required, product costs, lead-time and quality approaches including the possible disadvantage and benefits. As the research is of a holistic character, the systems approach is found to be the most appropriate for the tasks. Production and logistics problems are complex due to the many relations and interactions involved in the supply chain. A change in one part of the system has an impact on other parts of the system. Therefore, when structuring, analyzing and solving these complex problems, the systems approach gives a more holistic picture of the system. As the investigation covers the supply chain process for a system, from supplier level until the final customer, the systems approach is found feasible for this master thesis.

3.1 **Research methods**

In contrast to the research approaches, which constitute the main ideas behind the study, there might be a difference in the method used for different parts of the study as the method explains the procedures of collecting, structuring and analyzing data (Wallén, 1996). The follow sections explain the inductive, deductive and abductive methods and justify how this thesis has used them.

3.1.0 **Inductive, deductive and abductive methods**

Two main method approaches can be identified: the inductive and the deductive methods. Choosing the method for a study depends on the relation the researcher sees between the theoretical and the empirical world. The inductive method has its origin in the collection of empirical data. From the gathered material general and theoretical conclusions are drawn. In contrast to the inductive method, the deductive method has its starting point in existing theory. With a sound knowledge of the theory the researcher develops a prediction of what empirical results to expect. At a later stage these predictions are tested and verified through empirical tests. The third method is the abductive method, which can be seen as a combination of the inductive and deductive methods. The researcher starts out with an observation in the empirical world and tries to find the forces behind this phenomenon. The
result is that the researcher moves back and forth between empirical data and theories (Paulsson, 2003).

3.1.1 Method used in this thesis

This study origin from a hypothesis which pretend to prove that existing theories within the field of lean manufacturing and SCM approaches could improve the current core business process of bicycle manufacturers. Hence, the deductive method is used as starting point for the research and it is combined with inductive approach along the study. The collected data was then used to set up a structure for what areas to further investigate and what theory to connect to the empirical findings. To follow up on the observations made, the author went back to the theory to complement the initial framework. This way of working implies an abductive approach.

3.2 Data collection

The gathering of data is an important, crucial and vital task that requires thought and planning in behind. The information sources are normally classified into two types: primary data and secondary data. Primary data refer to the data that is collected by agents or ourselves who known to us. “Studies made by others for their own purposes represent secondary data to you” (Schindler, 1998). Obviously, primary data has some more evident advantages than secondary data in the aspects of relevance and accuracy. “Using primary sources, researchers can collect precisely the information they want” (Schindler, 1998). In addition, primary data is more reliable than secondary type due to the specific research purpose.

3.2.0 Data used in this thesis

The data in this thesis mainly consists of both qualitative and quantitative information achieved from a wide range of sources like management and engineering literature, contact of suppliers, and Internet. A market analysis was previously carried out to reach deeper understanding of the market situation and the current factors affecting it. Information was gathered from these events and used primarily for understanding the structure of the bike market and the relations between its different parts. This knowledge was then used when mapping the current state of the present-day business processes from bike manufacturer till customers. In addition, secondary data often from books or articles were used.

3.3 Qualitative vs. Quantitative approach

There are two main methods, which are quantitative and qualitative. Qualitative and quantitative researches are two significantly different approaches. Quantitative research is typically associated with the process of enumerative induction. The power of the
quantitative method is that the data collected is more efficiently gathered, measured and compared than in the qualitative method (Patton, 1991).

Qualitative research mainly generates soft data, which often deals with explanatory concepts, less focused on quantifiable methods and is often try to find in-depth information or new knowledge about one specific situation while quantitative research aims to measure or explain the relation between variable (K.Blackmon, 2005). The four major methods used by qualitative researchers are, observation, analyzing texts and documents, interviews and recording and transcribing (Silverman, 2001). In practice these methods are usually combined for specific purpose like observation and interviews are combined during a study.

3.3.0 Studies used in this thesis

In this study the aim is to investigate the outcome of reengineering the current business process of bike manufacturers. Thus, both approaches, quantitative and qualitative, are going to be present along the thesis. To achieve deeper understanding of the problem status and to compare key factors, I found it appropriate to conduct a qualitative investigation. From another perspective quantitative study is also required since financial impact and production processes have to be calculated.

The qualitative method has been functional to quickly grasp the problem and develop knowledge within the investigated field. Whereas the quantitative has been used to transform the information into relevant measurable data. Subsequently the qualitative and the quantitative methods have been used in combination by first gaining knowledge within a field and then compile and transform the information into computable data. This enabled to establish and analyze the current and the future process setup.
4 Bicycle market analyses

The goal of this market analysis is to determine the attractiveness of the European market of bicycles and to understand its evolving opportunities and threats. This chapter includes a competitors and customer analysis. It also outlines the following dimensions of the market analysis:

- Market trends
- Market size, growth rate and profitability

4.0 Market trends

The bike market in the EU has been boosted in the last few years as a consequence of the high cost of public transport, the oil crisis and new healthy lifestyle trends. The bike market outlook is positive, although stability is the story of the recent past. The bicycle industry is a seasonal business that can be impacted by unusual weather, as well as an industry that relies on discretionary spending impacted by economic conditions.

Furthermore, national trends related to the green movement and environmental sustainability bode well for the future of bike usage as a transport. Every kilometer cycled instead of travelled by car avoids 0.2 kg CO₂ emission and also cyclists on the road improve road safety. Moreover, regular cycling reduces the risk of heart diseases, diabetes, high blood pressure, certain types of cancer and problems linked to obesity. And, cycling to work reduces absence through illness. (Institute, 2008).

Bicycle use continues to be a potential solution for improving peoples' health, as well as contributing to more livable communities. Hence, Governmental initiatives have been implemented in the last year to promote bike practice. European Union needs an approach that, via a range of practical and feasible measures, significantly reduces the levels of all private motorized transport in urban areas and that increases the proportion of journeys made by bicycle as well as on foot and by public transport. This approach has being already put down by countries as Belgium, Holland and the UK.

Belgium, where since 1997, the law allows employers to pay employees, who cycle to work, a tax-free fee of currently € 0.20 per cycled kilometer. Paying the fee is a favor, not a legal obligation. Research by the Belgian mobility department has shown that if a company pays the fee, cycling increases considerably. The number of cyclists rises from 6.3% to 9.5%, that is +50% (COLIBI & COLIPED, 2009).

Holland has also introduced a law allowing employers to give their employees a bike, tax-free, up to an amount of € 749. In 2008, 240,000 so-called company bikes were sold, i.e. almost 1 out of 5 new bikes, at an average price of € 836. Holland has 18 million bicycles for 16 million people. The bicycle accounts for 26% of all trips (COLIBI & COLIPED, 2009).
In 2005, the UK government launched the “Cycle to Work” tax incentive scheme. Employers can lend bicycles to their staff as a tax-free benefit on condition that the bicycles are mainly used to go to and from work or for work-related purposes. The employee ‘buys’ the bike at the end of the lending period for a nominal sum. And finally, on 23 April, the Italian government has decided to grant 30% restitution (on a maximum price of € 700) on all (electric) bikes sold in the country (COLIBI & COLIPED, 2009).

Riding for transportation is a growing market that is important for the industry because it establishes cycling as a legitimate part of the nation’s transportation mix. Bicycles are important not only as vehicles to make an entire trip to work, for instance, but also as connectors for short trips from mass transit. Bicycle Market Research Institute in 2006 reported that 73% of adult cyclists rode for recreation, 53% for fitness, 10% for commuting, 8% racing and 6% sport. The figures add up to more than 100% because some ride in multiple ways (Institute, 2008)
4.1 Market size and growth rate

The Figure 2 represents the bicycle sale within EU (2008) being the total 20,407,000 units. Germany appears to be the main bike user followed France and Great Britain.

Figure 2: European bicycle sales (EU 27) 2008 country ranking (1000 units) (COLIBI & COLIPED, 2009)
The Table 3 shows the bike sale average price (€) per country, being the higher 688 € in The Netherlands. This average price is as consequents of a Dutch policy introduced years ago which allows employers to give their employees a tax-free bike up to an amount of € 749. The average prices are slightly low due to the deviation in price between big supermarkets, where it is possible to find bicycles for €90, and independent bike dealers (IBD).

Table 3: Bicycle sales average price (€) within EU (2008) (COLIBI & COLIPED, 2009)

<table>
<thead>
<tr>
<th>Country</th>
<th>Average price (€)</th>
<th>Country</th>
<th>Average price (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Netherlands</td>
<td>688</td>
<td>Portugal</td>
<td>140</td>
</tr>
<tr>
<td>Finland</td>
<td>420</td>
<td>Czech Republic</td>
<td>130</td>
</tr>
<tr>
<td>Germany</td>
<td>386</td>
<td>Poland</td>
<td>130</td>
</tr>
<tr>
<td>Austria</td>
<td>370</td>
<td>Hungry</td>
<td>120</td>
</tr>
<tr>
<td>Denmark</td>
<td>370</td>
<td>Malta</td>
<td>120</td>
</tr>
<tr>
<td>Belgium</td>
<td>335</td>
<td>Slovakia</td>
<td>110</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>335</td>
<td>Greece</td>
<td>110</td>
</tr>
<tr>
<td>Sweden</td>
<td>320</td>
<td>Slovenia</td>
<td>110</td>
</tr>
<tr>
<td>Italy</td>
<td>290</td>
<td>Lithuania</td>
<td>100</td>
</tr>
<tr>
<td>France</td>
<td>262</td>
<td>Bulgaria</td>
<td>100</td>
</tr>
<tr>
<td>Spain</td>
<td>200</td>
<td>Romania</td>
<td>100</td>
</tr>
<tr>
<td>Great Britain</td>
<td>190</td>
<td>Cyprus</td>
<td>100</td>
</tr>
<tr>
<td>Ireland</td>
<td>190</td>
<td>Estonia</td>
<td>100</td>
</tr>
</tbody>
</table>
The Figure 3 represents bicycle production by countries within EU where 6 out of 27 are responsible of the 70% of the production. Some of these countries are historical bicycle countries like Italy, Germany, France and The Netherlands.

Figure 3: Bicycle production in 1000 units within EU (2008) (COLIBI & COLIPED, 2009)

The Table 4 simplifies the information illustrate in Figure 3 and shows the six main bicycle producer of the EU and their respective production share (%).

Table 4: Main bike producers in EU (2008)

<table>
<thead>
<tr>
<th>Country</th>
<th>Quantity (1000 units)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>2380</td>
<td>18</td>
</tr>
<tr>
<td>Germany</td>
<td>2370</td>
<td>18</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>1129</td>
<td>9</td>
</tr>
<tr>
<td>Poland</td>
<td>1116</td>
<td>8</td>
</tr>
<tr>
<td>France</td>
<td>1110</td>
<td>8</td>
</tr>
<tr>
<td>Portugal</td>
<td>1100</td>
<td>8</td>
</tr>
</tbody>
</table>
The Figure 4 represents the bike parts and accessories producer by countries in EU (2008) being, Germany, Italy and France are the big players with exemption of The Netherlands. Additionally, Romania appears to be an important accessory producer.

![Figure 4: Bicycle parts & accessories production (M€) within EU (2008) (COLIBI & COLIPED, 2009)](image)

Table 5 summaries the most significant bicycle market figures within the EU in the course of 2008. It presents the countries with higher bicycle sales, which are Germany, France and UK. They embraced more than 50% of the bicycle sales within the euro zone. The Netherlands, Sweden and Denmark are also included in the table due to their remarkable bicycle usage.
The Netherlands and Germany produced more than 60% of their bicycle sales internally; being the imports of Holland the lowest followed after by Germany. Both Dutch and German customers had preferences for homemade bike brands during 2008. In the contrary, there is the UK where there were not bike production whatsoever, being all the bicycles and components imported.

In the European Bike Market article done by COLIBI and COLIPED is mentioned that despite the big competition with Asian imports the European Bicycle industry is still strong, producing more than 60% of the market consumption.

In The Netherlands customers were more likely to purchase at the IBD, 81% bicycles were bought through them in 2008. Followed by German and Danish customer whom bought 63% of the brand-new bicycle at IBD.

The Internet as a distribution channel seems to have reached its limits in Holland during 2008 as far as bicycles are concerned. And in Germany the market share of online sales has been stable at 5% for the past three years. Internet sale is supposed to rise around the others EU members till equalize the 6% roof figure of Holland. This infers that in the coming years the number of bicycles sold on the Internet could reach up to 1200000 units within EU.

The average sale price (€) goes from €190 in UK till €688 in The Netherlands but, prices vastly change depending on the distribution channel. For example, the average sale price at a mass merchant supermarket in France is less than €100, while average sale price at the IBD is not less than €573. The other countries in the

Table 5 have even higher average prices (€) than France an exception of the UK. Hence, the average price (€) at the IBD, within those countries, may be somewhere around €573 or allegedly higher.

The average bicycle dealer’s revenue is 47.4% bicycles, 35.5% parts and accessories, 10.7% bicycle repair, 0.8% bicycle rental, 1.9% fitness equipment and 3.5% "other." The average store sells approximately 650 bicycles per year, carries five bicycle brands (though not all in great depth), and numerous accessories brands. Recent trends are toward consolidation
with retailers carrying somewhat fewer bicycle brands, sometimes at the urging of their suppliers. Gross margins on bicycles average about 37%, though the break-even point has been shown to be 38.6% for the average store (the average "cost of doing business") (Institute, 2008).

4.2 Competitors analysis

This competitor’s analysis aims to illustrate a casual knowledge about bikes brand. It aims to provide information about the major bike brands operating in the European market and their market strategies. All the information described in this section about bike brands was found in their companies’ websites during April 2010. In contrast with other manufacturing companies, they did not public much information about their financial figures such as annual report. So, they were evaluated in terms of product categories (Urban bicycles), price and company’s values and strategy. For evaluation figures, see Table 14 within Table 6:

There are a large number of bicycles brands operating in the European market. The selection for this analysis was based on two criteria, brand magnitude and product category. The brand magnitude is associated with the level of presence in the market of the different EU members. While the product category was on the subject of brands that are specialized within the product category of urban bikes.

Commuting hybrid bicycles and single speed bikes, which could be grouped inside the group of urban bicycles, represent more than 50% of the bike sale in the EU. Hence, the urban category is the center of this section.

Based on these criteria, the ten most popular brands in the European market appear to be Trek, Specialized under the name of Globe, Felt, Charge, Swobo, Marin, Giant, Scott and Cannondale. These top ten brands have the characteristics of being market leader in Europe and are also market leader within the urban category. It is important to mention that there are also many local brands that are really successful in their respective countries but to some extent unknown outside them. For example, Grescent is rather popular in Sweden but somewhat unknown abroad.

The Table 6 represents the Trek section of the Table 14, which is in the Appendix A. It is divided in five columns that describe brand name, number of different bicycle within the urban category, price range of the bikes, delivery type and total number of choices. For this particular example, the urban category of Trek is divided into six different product lines and offers six different bicycle models. The total number of bicycle choices within the urban category is 15. Thus, there are two models of Soho with different components, frame color and consequently price. Table 6: Section of Table 14 within Appendix A

<table>
<thead>
<tr>
<th>Brand</th>
<th>Urban Category</th>
<th>Price (€)</th>
<th>Delivery</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trek</td>
<td>Eco Design (4)</td>
<td>490-660</td>
<td>Dealer</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Porland</td>
<td>1250</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Valencia (2)</td>
<td>500-1600</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Allant (2)</td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soho (2)</td>
<td>420-800</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>District (4)</td>
<td>600-750</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As an average each brand has an urban category with 6 to 7 lines of bicycles. The average number of bicycles offer by each brand is 15. The average price per bicycle among these ten brands is €730, being the minimum €400 and the maximum €1600.

Beside Swobo that operates, as retailer and wholesaler, the rest of the brands are just wholesalers so that, the only possible way to purchase their bicycle is through a dealer. Swobo is the only brand that sells on the Internet and deliver directly to the customer although this service is only available in the USA.

The ten bike brands offer also a vast choice of road, and cross-country bikes. Bike brands tend to diversify their bike categories so when the brand is strong enough within one category a new category is launched. For example, Specialized has its urban category under other brand name to differentiate the urban category form the others.

When it comes to advertisement the main adjective employ to describe their bicycles are green, reliable and innovative and they also promote them as tool to improve healthier lifestyle and leisure. For instance, Trek describes their bikes as inherently green and Specialized targets eco-conscious customer

### 4.3 Customer analysis

This customer analysis identifies what are the target customers of a bike brand, which produce urban bicycle, by studying the needs, the values, and the psychological characteristics. It also describes the target customer especially in terms of purchasing process and consumption characteristics.

The bicycle brand has two main customers that are **dealers** and **end customers**. On one hand, the dealers see the bicycle brand as a business opportunity and work as a middleman between the producer and the end customer. On the other hand, the end customer sees the bicycle brand in term of product qualities and functionality. Both type of customer are described separately along this section.

**Dealers** are mainly searching for products that give them big profit. They want to reduce risk investment and boost profit. To reduce risk investment brand awareness is an important factor because it is always easy to sell a well-know brand. Service quality and reliability is also an important thing for a dealer. Bike brand must be able to have reliable deliveries and warranty service. The payment type is also an important issue so payment facility is will reduce investment risk and benefit. Contract of exclusivity will also withdraw nearest competence (Action Bikes, 2009).
Bikes dealers expected benefits:
Profit
Awareness
Availability
Reliability
Quality

The end customers evaluate the product in terms of price, design and quality components. Customer with a good sense of purchase will be willing to do a tradeoff between brands but will not scarify quality components. Some bicycle components, such Shimano, stand for quality and reliability and work as a bike endorsement and enhance the brand quality. Lightness appears to be a customer desire although it is not significant for the final decision (Action Bikes, 2009).

Regarding with purchase process customer prefers go to one or two dealers compare prices and make the final definition. They will rather take the bike the same day although as a average they are willing to wait between 5 to 7 days (Action Bikes, 2009).

End customers expected benefits:
Design
Quality
Functionality
Lightness
5 Business processes within the bicycle industry

This chapter describes the general business strategy followed by bicycle market leader brands. It also aims to analyze the business processes of the bicycle industry and to create an As-Is process depiction of them. After that, the As-Is process shortcomings are described and a To-be process framework is suggest. The chapter terminates presenting a business To-be process alternative.

5.0 Business strategy followed by bicycle market leader brands

This chapter describes to a certain extent how bicycle market leader brands operate. The description presented here need to be seen as a general business pattern, rather than an universal directive to appraise every single bicycle brand because there are many different business models. There are more than hundreds of bicycle brands worldwide and each of them has their own business strategy. But when it comes to supply chain and operations, bicycle market leader brands apply the same business structure and this is what this section intend to give a picture of.

The production of bicycles is currently based on economics of scale where cost per unit reduction is the strategy to follow. Seeking cost per unit reduction, components, such as rims, handlebars, etc, have been strategically outsourced. Thus, outsourcing has become the trend to follow in order to remain competitive. Because of that subcontractors have been able to gained experience and have achieved great level specialization within their respective fields. Bicycle brands saw that improvement as a prospect; as a result manufacturing has been wisely delegated to subcontractors. Now some of the most important bicycle brands have completely outsourced their low and medium bicycle lines and they have shifted from manufacturers to assemblers (Action Bikes, 2009).

Subcontractors now describe themselves as Original Equipment Manufacturer (OEM). They manufacture products that are purchased by a company and retailed under the purchasing company’s brand name. OEMs refer to the company that originally manufactured the product. OEMs rely on their ability to drive down the cost of production through economies of scale. Using an OEM allows the purchasing company to obtain the needed components or products without owning and operating a factory. (Kayne, 2010).

Bicycle market leader brands, like Trek, entrust their production to OEMs located mainly in Taiwan. Bicycle brands are in charge of design, assembly and marketing while OEMs manufacturer frames and components for them. It could be also the case where the bicycle brand only design and market. There are multiple alignments between OEMs and bicycle brands although, this information is part of their business strategy and is confidential. It is in fact difficult to describe these alignments but not the big picture of the current operations (Action Bikes, 2009).

Relocating facilities overseas and outsourcing production have brought substantial benefits to bicycle market leader brands although; there are numerous downsides when production
is moved to Asia. The downsides of producing overseas have to be seemed as a competitive advantage by European bike manufacturers.

5.1 Business processes analysis As-Is Process

The objective of this stage is to depict the business processes of bicycle market leaders. As it was mentioned earlier, there are numerous business models and this section only endeavor to show the big picture.

The Figure 5 is straightforward supply chain sketch of the current operations of bicycle market leaders. Aiming cost per unit reduction they have outsourced their production to OEMs mainly located in Taiwan. The OEMs are specialized into different areas so that, bicycle brands have multiple sourcing.

Based on forecast, the components are pushed from the OEMs to the assembly facilities, which is also located in Taiwan. The assembly facilities are own by bicycle brands although they can be an outsourced too. The assemblage is handmade and then bikes are ship till destination, in this study Europe, being the shipping time between Asia and Europe 30-45 days by sea (Action Bikes, 2009).

Located at the assembly facility the material requirement planning (MRP) manages all the operations from OEMs till customers. Hence, all the players involve in the supply chain are directly depending on the MRP. The centralize MRP is push system; production planning is done for all levels in advance. Once production is completed, units are pushed to the next level (Action Bikes, 2009).

![Figure 5: As-Is Process](image-url)
Depending on the sale volume, bicycle brands have one or more warehouses strategically located in Europe. The dealers have directly access to the warehouse inventory before placing an order. When an order is placed, bicycles are shipped to dealer being the lead-time between 5-8 days. When the bicycle arrives to the dealer, it has to be assembled and adjusted for the customer. Dealers usually have in display on or two bicycles of each model so customer can see them. Although in most of the cases, bicycles have to be ordered because the color or sizes required are not in stock (Action Bikes, 2009).

5.2 As-Is Process shortcomings

Manufacturing overseas bicycle companies have decreased production cost while lead-times and logistic cost have increased. Due to their location, production must be based on forecast and high volumes. The high the volume, the high inventory to be held and all the risk that this situation presents, like obsolescent, damage, and holding cost. The long distance and high volumes of work-in-progress (WIP), which are distributed along the whole supply chain, make the current system inflexible and less responsive.

The centralize production system based on MRP presents complexity problems regarding uncertainty and data integrity. Based on forecast, the material requirement planning (MRP) and a material production schedule (MPS) are generated. MRP assumes that all required information is known with certainty. However, uncertainties do exist. The two key sources of uncertainty are the forecasts for future sales of the end item and the estimation of the production lead-times from one level to another. So, an optimal policy included safety stock to protect against the uncertainty of demand. The MRP system uses also safety lead times to compensate for the uncertainty of production. In practice, both sources of uncertainty are generally present and some mixture of both safety stocks and safety lead times is used (Nahmias, 2005).

MRP is “nervousness”, the term was coined by Steele (1973), who used it to refer to the changes that can occur in a schedule when the horizon is moved forward one period. Some of the causes of nervousness include unanticipated changes in the MPS because of updated forecasts, late deliveries of raw materials, failure of key equipment, absenteeism of key personnel, and unpredictable yields.

Data integrity is needed in order to operate effectively the MRP. An MRP system can function in effect only if the numbers representing inventory levels are accurate. It is easy for incorrect data to make their way into the scheduling system. MRP is to have a positive impact on the overall production-scheduling problem; the inventory records must be an accurate reflection of the actual state of the system (Nahmias, 2005).

Since production is based on forecast new lines of bicycles are launched every year, being the dealer the end buffer. If at the end of the season bicycles are not sold, the bike dealers must deduct them and lower their profit (Action Bikes, 2009).
Table 7: As-Is process SWOT matrix

<table>
<thead>
<tr>
<th>As-Is process</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>
| Within the model and the execution | Low worker idle time  
High production rate  
Improve production efficiency  
Low labor cost  
Reduce setups and setup costs  
Adjust workforce levels | High inventory and WIP  
Low flexibility  
High inventory cost  
Quality problems  
Safety stock and safety lead times  
Data integrity  
Uncertainties  
Long lead-times  
No customization |
| Outside the model and the execution | Multiple sourcing | Reliability required of suppliers  
Dealer risk  
Multiple players |
5.3 **To-be process framework**

The objective of this section is to outline what are the best practices, the management tools and the thriving business models. Innovative practices would be adopted from anywhere, no matter what their source. Those successful practices would be used as a reference to improve the shortcoming of the **As-Is process**.

After defining the shortcoming of the **As-Is process**, the first step is the benchmarking phase. Benchmarking is the comparing of both the performance of the organization’s processes and the way those processes is conducted with those relevant peer organizations to obtain ideas for improvement (Mangenelli, 1994).

The development of the **To-be process** is developed throughout a mixture of benchmark companies, and bearing in mind the principles of process design. The companies below are the benchmarks that are brought into play to create **To-be process**.

**Toyota**

Toyota is a referent company within the automobile industry due to Just-in-time (JIT) management philosophy. It aims to decrease lead-times, inventories, work-in-process and seeks a continuous improvement philosophy. It also eases to quickly identify quality problems before large inventories of defective parts build up. Customer satisfaction is the driven-train of each operation. Likewise, Toyota success is also based on their idea of standard modular part. The vehicles share a great number of parts and critical parts are standard for all of them. In that way, Toyota can afford to have fewer suppliers and better quality controls.

**IKEA**

IKEA success is based on their business model where products are designed to reduce shipment cost and to be assembled by customers. Products are designed to be easily transported and store so that packaging volume and weight are key factors when they are designed. IKEA has lower logistics and labor cost compare with others furniture retailer because customers transport and assemble the furniture themselves.

**Dell computers**

Dell Computers triumph is because of its innovative business idea. Customer can purchase customize laptops through the Internet and get them straightway. Dell sells the computers even before suppliers get paid

The **To-be process** needs to have a more responsive supply chain and to do so; lead-times and WIP have to be reduced. The **As-Is process** have to be reengineered at three levels concerning to the business idea, the management system and the product concept.

Dell computer business strategy would be the benchmark regarding the business idea. Toyota management philosophy, JIT, would be the point of reference to improve the
management system. Finally, IKEA product design would be the target to improve the product concept.

5.4 Business To-be process alternative

The objective of this section is to describe how the To-be process would operate.

The first movement would be to relocate the assembly line close to the market. Location would be a key competitive advantage compare with companies that assemble overseas. Having the assembly line nearby the market, lead-times would be reduced and better customer service would be provided.

The centralize MRP system would be partially replaced by JIT. The JIT should be viewed as an addition to, rather than a replacement for the MRP. For JIT to work properly, it must be coordinated with the purchasing system to assure the smooth flow of material throughout the entire production process (Nahmias, 2005).

OEMs frame manufacturers would remain in Asia as they are in the As-Is process but bicycle components would be however acquired from the local market. The idea is to build a more responsiveness supply chain and to do so, small and more frequent deliveries are essential. Thus, special relationship with suppliers must be in place to assure that deliveries are made on an as-needed basis.

An E-Business platform would link customers and the assembly facility. Dealer would be no longer a middleman, being instead a customer alternative. Both dealers and end customers would be able to place orders through the E-Business platform where inventory levels would be continually updated.

Previous business agreement, dealers would promote the bicycle brand. The E-Business platform and the dealer would have the same prices. Bike dealer would be provided with one or two bicycle sample that will be at the store for display. Dealer would earn their respective profit when either the sample or new bikes would be ordered through their login at the E-Business platform. In that way, dealers would minimize risk and profit deduction due to inventory obsolescent.
The Figure 6 is a straightforward draw of how would look the **To-be process**. The assembly line and the central warehouse of the **As-is process** are united and placed close to the market. The central warehouse is not longer needed because production would be JIT, although, a safety stock of components would be required.

![Diagram of To-be process]

**Figure 6: To-be process**

At the E-Business platform customer would be able to purchase customized bicycles. Furthermore, customer would have the choices to purchase at the dealer or on the e-business platform because prices are the same. The bicycle would be dispatched to the customer so packaging must be optimized to reduce shipping cost.

This business strategy must be supported by the idea of **do-it-yourself**, which it is one of the core business strategies of IKEA. **Do-it-yourself** consist on the basis that bicycles would be shipped 90% assembled and customer would be required to attaching pedals, wheel, handlebars and adjustments. And the building process would only involve one tool for all the adjustments.
### Table 8: To-be process SWOT matrix

<table>
<thead>
<tr>
<th>To-be process</th>
<th>Strengths +</th>
<th>Weaknesses -</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Within the model and the execution</strong></td>
<td>Inventory reduction</td>
<td>Increase worker idle time</td>
</tr>
<tr>
<td></td>
<td>Improve coordination</td>
<td>Decrease the production rate</td>
</tr>
<tr>
<td></td>
<td>Decrease inventory cost</td>
<td>Slow to react to changes in demand</td>
</tr>
<tr>
<td></td>
<td>Improve production efficiency</td>
<td>Ignore future demand pattern</td>
</tr>
<tr>
<td></td>
<td>High labor cost</td>
<td>Safety stock</td>
</tr>
<tr>
<td></td>
<td>Efficient product tracking</td>
<td>Employees commitment</td>
</tr>
<tr>
<td></td>
<td>Inexpensive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Points up quality problems quickly</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Better reaction to uncertainties</td>
<td></td>
</tr>
<tr>
<td><strong>Outside the model and the execution</strong></td>
<td>Improve relationship with vendors</td>
<td>Decreased opportunity for multiple sourcing</td>
</tr>
<tr>
<td></td>
<td>Decrease dealer risk</td>
<td>Suppliers must react more quickly</td>
</tr>
<tr>
<td></td>
<td>Increased customer choices</td>
<td>Reliability required of suppliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Customer acceptance</td>
</tr>
</tbody>
</table>
6  *To-be process business alternative conception*

This chapter represents the fundament of new business model that is based on the *To-be process* principals. It aims to define the basis of the business model regarding production system, and product concept. The business concept is started from scratch so the next points are presented along the chapter:

- Business concept and brand name
- Bicycle design concept
- Strategy planning
- Production system design

6.0  **Business concept and branding**

The business concept, which is based on the *To-be process* principals, would be a company that assemble customized bicycle and sell them through an E-business platform. The bicycles would be within the product category city/urban bicycles. Customers would be able to customize and to order bicycles on the E-business platform, and to assemble themselves. The idea of Do-it-yourself would be part of the brand values.

I brand name the business concept so it can be cited by its name along this chapter. Two marketing book, (Calkins, 2005) and (Kapferer, 2004), are the literature use to create the brand name.

The brand name will symbolize and distinguish the values, performance and personality of the company. It will just work like an address to the company products and values. Consequently, I have first to define company brand set of values and personality to know where the brand is leading.

- Aesthetics
- Simplicity
- Exclusivity
- Eco-friendly
- Quality and reliability

Brand do not describe products, brands distinguish products. The founders of Apple were well aware of this: within a few weeks the market would know that Apple made microcomputers. It was therefore unnecessary to fall into the trap of names such as Microcomputers International or Computer Research Systems. The brand name therefore should not describe what the product does but reveal or suggest a difference(Kapferer, 2004).

It is important to choose a name without limit scope in space or time. Many names end up preventing the brand from developing naturally over time because they are too restrictive. For instance, Europ Assistance hinders the geographical extension. Any brand must be given
the potential to become international in case it should want to become so one day (Kapferer, 2004).

The brand name must be memorable and own able so generic names may be avoided. They are easy to copy and will trap the new brand within a specific area. The brand name must be able to stand the test of time, whatever the trend at any given moment. Choosing a name that defines a single product benefit too narrowly or too specifically may only be successful in a much smaller category. For instance, Kentucky Fried Chicken has spent tens of millions of dollars trying to move to the more general KFC as fried foods have lost some of their consumer appeal (Calkins, 2005).

After reading the marketing literature, I can conclude that the brand name itself is not the most relevant issue when a new brand is created. I decided to name my brand Jeppsson which is not a generic name, easy to pronounce and memorable. It has not limit of scope either in time or space and represents robustness, due to its length, and royalty because it is a family name.

### 6.1 Bicycles design concept

**Jeppsson** would have an urban bicycle lines with three models. The three models would be within the categories of fixies or single speed bicycles.

Fixies and single speed bicycles have become really popular around commuters. The lack of gearing makes them low maintenance, simple to ride and durable. Since **Jeppsson** do not have any kind of experience within the bike industry and would like to produce custom bicycles, fixies are the most reasonable option to start with. They require less expertise and investment and are easy to customize. Moreover, there are really easy to use, trendy and affordable.

The three models would be called **Slussen 3.0v**, **Bernauer 6.0v** and **Urquinaona 1.0**, which are tube stations of cosmopolitan neighborhood in cities like Stockholm, Berlin and Barcelona. The three models would target different type of customer profile. For technical specifications see Appendix B.

Brief description about the three models:

- The **Urquinaona 1.0v** would be a single speed bicycle with a simple and solid design. It would have an aggressive riding geometry like a track bike.

- The **Bernauer 3.0v** would be a comfort single speed bicycle that would offer an upper right geometry. It would be accented with silver chain guard, mudguard and retro handlebar. Its geometry and simplicity would make this classic bicycle a pleasure to ride both in the city and countryside.
• The **Slussen 6.0v** would be a retro bicycle with an elegant upright riding position. It would have a vintage look but would perform like a modern bicycle. It would be assembled with fender, chain guard and rear carrier to ease your daily commuting.

As a bicycle brand, **Jeppsson** would like to be associated with performance, quality, simplicity, and aesthetics. To achieve the first two properties, **Jeppsson** would build the bicycle with well-known brand of components that would work as endorsement. For instance, frames with steel tube Reynolds stand up for quality. Simplicity is a characteristic associated with fixies and aesthetics would be part of the customization service that **Jeppsson** would offer.

As it mentioned earlier **Jeppsson** would operate based on customer order (JIT). Hence, the design of the bicycles would play a significant role in the implementation and success of the JIT management system. For example, Toyota is well known for using, so-called “modular-assembly-parts”, to ease assembly and to reduce complexity. The “modular-assembly-parts” enhance flexibility and speed up operations and what's more they fit in any model.

With “modular-assembly-parts” as a benchmark, I came up with the principle of **standard-share-parts**. Thus, the three bicycles models would have in comment the maximum number of parts to enhance standardization. The **standard-share-parts** would follow the next criterion:

1. All components would come with bolt head Allen key 5. To minimize tool complexity and the idle time of exchanging tools. Both operator and customer will be able to assemble or disassemble saddle, stem, seat-post, calipers, crank-set, levers, handlebar and wheels which only one tool.

2. Bottom bracket, seat-post and headset would have the same diameter and length no matter the model. Supplier selection and quality issues would be a lot easy to solve if these components are standard. Both headset and bottom bracket are a critical components because they have directly influence on the bike performance. Conversely, customer do not take them into account when purchase.

3. All the three models will have the same wheels size (700c), crank-set (170mm) and braking system.

The rest of components would be selected according with bicycles expected performance and characteristics.
The **Table 9** shows the **standard-share-components** and the exclusive components of each bicycle model. The **Standard-share-components** do not present any distinction while unique component are in red. Apart from the frame, and handlebar, the rest of components are the same for all the three models. The main exception is the Urquinaona1.0v model that is assemble with different saddle and stem.

<table>
<thead>
<tr>
<th>MODELS</th>
<th>Slussen 3.0v</th>
<th>Bernauer 6.0v</th>
<th>Urquinaona 1.0v</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRAME</td>
<td>Cr-Mo</td>
<td>Cr-Mo</td>
<td>Cr-Mo</td>
</tr>
<tr>
<td>FORK</td>
<td>Cr-Mo</td>
<td>Cr-Mo</td>
<td>Cr-Mo</td>
</tr>
<tr>
<td>CRANKSET</td>
<td>170mm</td>
<td>170mm</td>
<td>170mm</td>
</tr>
<tr>
<td>LEVERS</td>
<td>Tektro</td>
<td>Tektro</td>
<td>Tektro</td>
</tr>
<tr>
<td>SADDLE</td>
<td>Vintage</td>
<td>Vintage</td>
<td><strong>Classic Road</strong></td>
</tr>
<tr>
<td>SEATPOST</td>
<td>Alloy- 27.2mm</td>
<td>Alloy- 27.2mm</td>
<td>Alloy- 27.2mm</td>
</tr>
<tr>
<td>SEAT CLAMP</td>
<td>Silver Classic</td>
<td>Silver Classic</td>
<td>Silver Classic</td>
</tr>
<tr>
<td>PEDALS</td>
<td>Road pedal</td>
<td>Road pedal</td>
<td>Road pedal</td>
</tr>
<tr>
<td>CHAIN</td>
<td>1/2x1/8&quot;</td>
<td>1/2x1/8&quot;</td>
<td>1/2x1/8&quot;</td>
</tr>
<tr>
<td>CASSETTE</td>
<td>Freewheel, 17t</td>
<td>Freewheel, 17t</td>
<td>Freewheel, 17t</td>
</tr>
<tr>
<td>FRONT HUB</td>
<td>High Flange</td>
<td>High Flange</td>
<td>High Flange</td>
</tr>
<tr>
<td>REAR HUB</td>
<td>Flip-flop</td>
<td>Flip-flop</td>
<td>Flip-flop</td>
</tr>
<tr>
<td>HEADSET</td>
<td>Ahead</td>
<td>Ahead</td>
<td>Ahead</td>
</tr>
<tr>
<td>HANDLEBAR</td>
<td><strong>French</strong></td>
<td><strong>Millan</strong></td>
<td><strong>Urban</strong></td>
</tr>
<tr>
<td>STEM</td>
<td>17° 26mm</td>
<td>17° 26mm</td>
<td><strong>7° 100mm</strong></td>
</tr>
<tr>
<td>BRAKE</td>
<td>Caliper</td>
<td>Caliper</td>
<td>Caliper</td>
</tr>
<tr>
<td>RACK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RIMS</td>
<td>700c deep V</td>
<td>700c deep V</td>
<td>700c deep V</td>
</tr>
<tr>
<td>TIRES</td>
<td>700x23c</td>
<td>700x23c</td>
<td>700x23c</td>
</tr>
<tr>
<td>FENDER</td>
<td>Stainless</td>
<td>Stainless</td>
<td></td>
</tr>
<tr>
<td>CHAINCASE</td>
<td>Stainless</td>
<td>Stainless</td>
<td></td>
</tr>
<tr>
<td>INNER TUB</td>
<td>700c</td>
<td>700c</td>
<td>700c</td>
</tr>
<tr>
<td>SPOKES</td>
<td>Stainless</td>
<td>Stainless</td>
<td>Stainless</td>
</tr>
<tr>
<td>BOTTOM BRACKET</td>
<td>Cartridge</td>
<td>Cartridge</td>
<td>Cartridge</td>
</tr>
</tbody>
</table>

- Unique Component
- Lack of Component
Customization

Jeppsson would start providing basic customization choices and more complexity would be put into action as experience is acquired. It would be done at three levels: Main structure, wheel set and what I call low components.

- Main structure is the frame, and the fork. The customization consists on selecting a solid color (red, orange, yellow, green, blue, black, and white) and the stickers or decals design (graphic font and brand name). For example, a customer would be able to ride his or her own name in the frame apart from choosing the bike color.
- Wheel set is the hub, rim, and spokes. The rims and hubs would have five alternative colors selection (white, blue, red, yellow, and green).
- Low components are the handlebar, chain, grips, cables, and saddle. They provide vast customization alternatives and are low in price and can be obtained from different wholesalers in the local market.

Table 10: Customization alternatives

<table>
<thead>
<tr>
<th>Models</th>
<th>Slussen 3.0v</th>
<th>Bernauer 6.0v</th>
<th>Urquinaona 1.0v</th>
<th>Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Fork</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

  **MAIN STRUCTURE** 49

| HUBS         |              |               |                |
|             |              |               |                |
| RIMS        |              |               |                | 5       |

  **WHEEL SET** 25

| HANDLEBAR   | 1             | 1             | 2             | 2 |
| CABLE       | 5             | 5             | 5             | 5 |
| SADDLE      | 5             | 5             | 5             | 5 |

  **LOW COMPONENTS** 6250

With this customization, the customer would have 49 main structure and 25 wheel-set different combinations per model, being the total main structure/wheel-set 1225 combination. Taking into account low components the number of combinations goes up to 6250, which it is a farfetched number. Hence, with this basic customization Jeppsson would be able to provide more bicycle combination than any of the current bicycle brand leaders.
6.2 **Strategy Planning**

The strategy planning is the long-term decision of the production system design. It would sustain *Jeppsson* business idea on the long run.

*Jeppsson* facility would be eventually located in Malmö. If the project goes on, further studies regarding location will be required regarding aspects, as proximity to market, tax incentive, and labor cost must be taken into account.

The facility would operate Just-in-time (JIT). And lean principals would support the JIT and would be the frameworks of the strategy planning:

A. **Visual Management** and **Five S** would focus on having visual order, organization, cleanliness and standardization. Both techniques would be employed at three levels:

- **Workplace**
  - Signs to identify the equipment location, the process flow, and the stock areas would be placed either on the floor and walls as well as the respective safety warnings.

- **Production control**
  - Visual process indicators would identify production status boards, output jobs in progress, and equipment maintenance.

- **Performance and measurement**
  - Quality charts, and KPI’s would be used as an appraisal for performance.

![Figure 7: Five S program](image)
A. **Total productive Maintenance (TPM)**
   Operator would be in charge of daily maintenance. They would learn how to clean the equipment and how to inspect for trouble signs.

B. **Zero Quality Control (ZQC)**
   They key to effective mistake-proofing is determining when and where defect-causing conditions arise and then figuring out how to detect or prevent these conditions, every time. For example, tools life expectancy or worn-out have to be measure to avoid defects.

D. **Kanban production system** to be effective would follow Toyota’s six rules:
   - Do not send defective products to the subsequent process
   - The subsequent process comes to withdraw only what is needed
   - Produce only the exact quantity withdrawn by the subsequent process
   - Equalize production
   - Kanban is a means to fine-tuning
   - Stabilize and rationalize the process

**Facility capacity**

The capacity of the facility is number of units that the plant will produce in a given time. Factors like costs of construction, equipment required, and labor cost were taken into account for the capacity strategy. Moreover, an additional cost for unforeseen was added.

The required investment for the first year would be the building, labor cost, machinery/tools, the E-business platform and others. These expenses would either remain constant the second year or increase because the business needs a capacity expansion. I decided to set 20% capacity expansion for the second year.

The Table 11 is an estimation of the initial investment required to start up.

<table>
<thead>
<tr>
<th>Investment</th>
<th>€/year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility</td>
<td>48000</td>
<td>building</td>
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<tr>
<td>Labor</td>
<td>100000</td>
<td>4 employees</td>
</tr>
<tr>
<td>Machinery and Equipment</td>
<td>35000</td>
<td>Painting cabin and tools</td>
</tr>
<tr>
<td>E-business platform</td>
<td>3000</td>
<td>website</td>
</tr>
<tr>
<td>Others</td>
<td>30000</td>
<td>unforeseen</td>
</tr>
<tr>
<td><strong>Total 1st year</strong></td>
<td></td>
<td><strong>216000</strong></td>
</tr>
<tr>
<td><strong>Total 2nd year</strong></td>
<td></td>
<td><strong>259200</strong></td>
</tr>
</tbody>
</table>

The previous market study reveals that the different in price between the retailer and the manufacturer are around 40-50 % and the urban bicycle average price offer by brand leader
is 700€. The Table 12 establishes the product cost and market price of the three bicycle models, being the benefit 35%.

<table>
<thead>
<tr>
<th>Bicycle</th>
<th>Production €</th>
<th>Market Price €</th>
<th>Gross Benefit €</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urquinaona 1.0v</td>
<td>455</td>
<td>650</td>
<td>195</td>
</tr>
<tr>
<td>Slussen 3.0v</td>
<td>469</td>
<td>670</td>
<td>201</td>
</tr>
<tr>
<td>Bernauer 6.0v</td>
<td>490</td>
<td>700</td>
<td>210</td>
</tr>
</tbody>
</table>

The break-even quantity is the minimum number of bicycle to be produced in order to cover investment. In the worse case scenario, the break-even quantity for the first year would be 1108 bicycle/year. For the second would be 1329 units/year due to 20% capacity expansion and this value is used for in the next calculation.

The total throughput time for painting, assembly and packaging of a bicycle is 141 min/units.

Based on the formula of Design Capacity and with these two parameters, I calculated the Available Time to Work being in this case is the required time:

\[ \text{Design Capacity (unit/year)} = \frac{\text{Available Time to Work (min/year)}}{\text{Throughput Time per Unit (min/unit)}} \]

\[ \text{The Available Time to Work (required)} = 186 \text{ min} \times 1329 \text{ units/year} = 187389 \text{ min/year} = 3123 \text{ hours/year} \]

In reality, people and machines can never maintain 100% efficiency and there may also be stoppages for other reasons. The preventive maintenance time and idle time must be added to the Required Time to Work. The maintenance would take 5 hours per week and the 10 idle time hours per week.

\[ \text{Required Time to Work} = 3123 \text{ hours/year} + (5 \text{ hours} \times 48 \text{ weeks}) + (10 \text{ hours} \times 48) \]
\[ \text{Required Time} = 3843 \text{ hour/year} \]

The facility would be required to work 52 week per year and 73 hours per wee
6.3 Production system design

The facility would have 3 workstations, painting coating, assembly and packaging. The three workstations would be modular. Modular workstations can be rearranged quickly to make new cell configurations. However, workstations need power, compressed air, and lighting. In many cases, these are supplied by utilities in the ceiling. To keep flexibility in workstation design, independent mobility must be part of the plan. A workstation should have its own lighting, but it should be powered with electricity and compressed air without going to the ceiling. One method for doing this is to supply each workstation with male/female connectors that can be daisy-chained together. One workstation powered from an existing drop in the ceiling could power the workstation next to it through electrical cords and rubber airlines. This station would then power the next station in the same manner, and so on (Duggan, 1198).

Orders would be produced one at a time, so-called one-piece-flow or continues flow manufacturing. By using one-piece-flow, the bicycle would have less risk of damage, deterioration, obsolescence and delay. Moreover, one-piece-flow would expose other problems so they can be addressed.

The Figure 8 shows the inner operational processes required to complete customer orders.

![Figure 8: Operations Diagram](image)

**Step 1:** Customer order would be placed on the E-commerce platform. Subsequently, the order would be attached to a production kanban (red circle) and place in the post 1.

**Step 2:** Then Operator would start processing the production kanban (red circle) waiting in the post 1. All the parts specified on the production kanban would be collected from the supermarket and would be deposited then in the work-in-process (WIP). In the WIP the kanban would become outbound stock and a second production kanban (green circle) containing painting specifications would be sent to post 2. The WIP would also be the pace maker of the production line.
Step 3: If a Kanban (green circle) exists in the post 2, it would be attached to a frame and enters station 1.

Step 4: After painting, the kanban together with the frame would be placed in the WIP and match with their respective outbound stock (components previously deposited). The frame and the outbound stock (bike parts) would wait a signal from downstream.

Step 5: when the signal comes from downstream the second kanban (green circle) would return to the post 2 with new painting specifications and the first production kanban (red circle) would proceed to Station 2 (assembly).

Step 6: Between station 2 and 3 there is a first-in-first-out (FIFO) so production kanban would be moved immediately to station 3 (packaging) and shipped directly to the customer. Then production kanban would return to post 1 and would wait for a new order.

The Table 13 presents the timed production sequences of the assembly line. It is divided in three main parts that represent the three workstations.

Table 13: Custom Assembly Bicycle Production Sequence

<table>
<thead>
<tr>
<th>Operation</th>
<th>Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station 1- Painting</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Sand blast with a low pressure and a light sand</td>
</tr>
<tr>
<td>B</td>
<td>Shoot a coat or two of primer</td>
</tr>
<tr>
<td>C</td>
<td>Shoot color</td>
</tr>
<tr>
<td>D</td>
<td>Overshoot a contrasting color, add pin striping, decals</td>
</tr>
<tr>
<td>E</td>
<td>Add a clear coat for added protection</td>
</tr>
<tr>
<td>Station 2 -Assembly</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Assemble head-set</td>
</tr>
<tr>
<td>G</td>
<td>Assemble Stem</td>
</tr>
<tr>
<td>H</td>
<td>Assemble bottom-bracket</td>
</tr>
<tr>
<td>I</td>
<td>Assemble crankset</td>
</tr>
<tr>
<td>J</td>
<td>Assemble chain</td>
</tr>
<tr>
<td>K</td>
<td>Assemble handlebar</td>
</tr>
<tr>
<td>L</td>
<td>Assemble caliper</td>
</tr>
<tr>
<td>M</td>
<td>Assemble levers</td>
</tr>
<tr>
<td>N</td>
<td>Assemble inner and outer cable</td>
</tr>
<tr>
<td>Q</td>
<td>Assemble rim take</td>
</tr>
<tr>
<td>R</td>
<td>Assemble tires and inner tube</td>
</tr>
<tr>
<td>R</td>
<td>Assemble cassette</td>
</tr>
<tr>
<td>Station 3- Packaging</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Unfold and staple cardboard box</td>
</tr>
<tr>
<td>W</td>
<td>Undo handle bar</td>
</tr>
<tr>
<td>X</td>
<td>Tight up wheel to the frame</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Y</strong></td>
<td>Place packaging protectors and rubbers</td>
</tr>
<tr>
<td><strong>Z</strong></td>
<td>Introduce instructions</td>
</tr>
<tr>
<td><strong>A1</strong></td>
<td>Close the package and stick customer address</td>
</tr>
</tbody>
</table>

**Throughput time** | 141
7 Conclusion

The following chapter is a synthesis of the discussion of this thesis.

The European market of bicycle could be seemed as a business opportunity due to its dimensions and future prospects. Internet bicycle sale is a growing market that have not reached it limit. Environment initiatives have increase bicycle usage and governments are creating policies to encourage it.

The Asian bike exports represent 40% of the EU market and Asian bike manufacturers have turn out to be very competitive in the past decade due to its low labor cost and its flexibility adapting edge technologies. In order to survive small and middle size European bike manufacturers would have to redesign their core business process.

Without a doubt the main advantage of European bike manufacturers is their location and customer royalty. Management philosophies like Just-in-time could help them to enhance flexibility, responsiveness and support their privilege locations, which are competitive factors in today’s economy as important as price and quality.

The To-be process presents an innovative business model base on:
- Implementation of Just-in-time management system
- Benchmarking the Dell Computer business model of customization and supply chain
- Benchmarking the IKEA idea of designing products for supply chain and that customer assemble the furniture themselves
- Introduce E-business platform

However, the main constrain to implement To-be process is that OEM are mainly located in Taiwan. OEMs located in Taiwan have lead-time between 90 to 120 days. Since the lead-time is too long, the To-be process required safety stocks. So, the bottleneck of the supply chain is the OEM location and this would be one of the barriers to implement JIT.

The JIT should be viewed as an addition to, rather than a replacement for the MRP. For JIT to work properly, it must be coordinated with the purchasing system. The main difficulty to implement JIT within the bicycle industry is that the bicycle market is certainly uneven. JIT is most efficient when the pattern of demand is stable and predictable.

In order to make JIT work, both supplier and employees will need to have high commitment. To cope with peak demand, employees will be required to work overtime since To-be process does not allow subcontracting. Another alternative would be to have temporal employees but temporality and commitment do not get along.

On the other hand, the supplier must be able to react quickly and provide sufficiently reliable parts but this would be rather difficult due to the OEMs location. Moreover, multiple sourcing becomes difficult within To-be process. Because of the customization, the system may be forced to deal with a single supplier in order to develop the close relationship that the system requires. Single sourcing presents risks for both suppliers and manufacturers. The manufacturer faces the risk that the supplier will be unable to supply parts when they
are need, and the supplier faces the risk that the manufacturer will suffer reverses and demand will drop.

Future work

In this paper some solutions are discussed only from the view of theory. In order to evaluate solutions and suggestions more scientific and acquire most feasible solutions, more detailed information is needed. Farther studies can be developed regarding the *To-be process*:

- Facility layout and location
- Transportation problems and supply chain analysis
- Packaging optimization-benchmarking IKEA, designing products for supply chain.
- Economical order quantity, inventory system and AHP supplier selection.
- Value stream mapping
8 References


Duggan, K. J. (1198). Facilities Design for Lean Manufacturing.


### Appendix A

#### Table 14: Competitor analysis figures (2009)

<table>
<thead>
<tr>
<th>Brand</th>
<th>Urban Product Line</th>
<th>Price (€)</th>
<th>Delivery</th>
<th>Choices</th>
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<td>Trek</td>
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<td>490-660</td>
<td>Dealer</td>
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<td>Bad boy (8)</td>
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Appendix B

Urquinaona 1.0v

Technical Specifications:

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<th>Frame Size</th>
<th>530 mm</th>
<th>560 mm</th>
<th>590 mm</th>
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<tbody>
<tr>
<td>A  Top tub length</td>
<td>530 mm</td>
<td>560 mm</td>
<td>590 mm</td>
</tr>
<tr>
<td>B  Seat tube length</td>
<td>530 mm</td>
<td>560 mm</td>
<td>590 mm</td>
</tr>
<tr>
<td>C  Heat tube length</td>
<td>125mm</td>
<td>150mm</td>
<td>175mm</td>
</tr>
<tr>
<td>D  Chain stay length</td>
<td>405mm</td>
<td>405mm</td>
<td>405mm</td>
</tr>
<tr>
<td>E  Bottom (To ground)</td>
<td>285 mm</td>
<td>285 mm</td>
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</tr>
<tr>
<td>F  Head Angle</td>
<td>73°</td>
<td>74°</td>
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<td>FE Seat Angle</td>
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<td></td>
<td>25.4mm</td>
<td>25.4 mm</td>
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</tr>
</tbody>
</table>

Frame: TIG welded Cr-Mo tubes
Fork: Cr with straight blades, drilled crown for front brake and clearance for fenders
Wheels: 700C 32-spoke, 30mm deep alloy rims and large flange flip-flop hubs
Cassette: 17T freewheel and 17t fixed cog
Handlebar: Urban Riser Bar, Ø25.4mm, 540cm
Stem: Aluminum Forged Ø26.0mm 7° 100mm
Crankset: single speed silver 170mm with 42T
Chain: single speed
Saddle: road
Brakes: Tektro caliper
Levers: Tektro front & rear brake levers
Bottom bracket: sealed bearing cartridge
Head set: Threadless 1-1/8" bearing sealed cartridge
Seat post: Aluminum Ø27.2mm, 300mm
Pedals: road
Tires: road 700x30c
Bernauer 3.0v

Technical Specifications:

<table>
<thead>
<tr>
<th></th>
<th>Frame Size</th>
<th>550 mm</th>
<th>590 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Top tub length</td>
<td>590 mm</td>
<td>605 mm</td>
<td></td>
</tr>
<tr>
<td>B Seat tube length</td>
<td>550 mm</td>
<td>590 mm</td>
<td></td>
</tr>
<tr>
<td>C Heat tube length</td>
<td>140mm</td>
<td>170mm</td>
<td></td>
</tr>
<tr>
<td>D Chain stay length</td>
<td>448mm</td>
<td>448mm</td>
<td></td>
</tr>
<tr>
<td>E Bottom (To ground)</td>
<td>285 mm</td>
<td>285 mm</td>
<td></td>
</tr>
<tr>
<td>F Head Angle</td>
<td>69°</td>
<td>69°</td>
<td></td>
</tr>
<tr>
<td>FE Seat Angle</td>
<td>71°</td>
<td>71°</td>
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<tr>
<td>K Offset</td>
<td>50 mm</td>
<td>50 mm</td>
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<tr>
<td>Botton Bracket Shell</td>
<td>68mm</td>
<td>68 mm</td>
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<tr>
<td>Seat clamp</td>
<td>30mm</td>
<td>30mm</td>
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<tr>
<td>Seat post diameter</td>
<td>27.2mm</td>
<td>27.2mm</td>
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</tr>
<tr>
<td>Fork tube (threadless)</td>
<td>25.4 mm</td>
<td>25.4 mm</td>
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</tr>
</tbody>
</table>

Frame: TIG welded Cr-Mo tubes
Fork: Cr with straight blades, drilled crown for front brake and clearance for fenders
Wheels: 700C 32-spoke, 30mm deep alloy rims and large flange flip-flop hubs
Cassette: 16T freewheel and 16t fixed cog
Handlebar: Milan Bar, Ø25.4mm, 570 mm (http://www.velo-orange.com/milanbar.html)
Stem: Aluminum Forged Ø26.0mm 17° 26mm
Crankset: single speed silver 170mm with 42T
Chain: single speed
Saddle: leather vintage
Brakes: Tektro caliper
Levers: Tektro front & rear brake levers
Bottom bracket: sealed bearing cartridge
Head set: Threadless 1-1/8" bearing sealed cartridge
Seat post: Aluminum Ø27.2mm, 300mm
Pedals: road
Tires: road 700x30c
Chain-guard: polished aluminum
Mudguards: polished finish 700c 37mm
**Slussen 6.0v**

**Technical Specifications:**

<table>
<thead>
<tr>
<th>Frame Size</th>
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<th>590 mm</th>
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<tbody>
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<td>25.4 mm</td>
<td>25.4 mm</td>
</tr>
</tbody>
</table>

**Frame:** TIG welded Cr-Mo tubes. Top tub is going down like a Dutch bike.

**Fork:** Cr with straight blades, drilled crown for front brake and clearance for fenders

**Wheels:** 700C 32-spoke, 30mm deep alloy rims and large flange flip-flop hubs

**Cassette:** 17T freewheel and 17t fixed cog

**Handlebar:** French Bar, Ø25.4mm, 490 mm (http://www.velo-orange.com/volebaha.html)

**Stem:** Aluminum Forged Ø26.0mm 17° 26mm

**Crankset:** single speed silver 170mm with 42T

**Chain:** single speed

**Saddle:** leather vintage

**Brakes:** Tektro caliper

**Levers:** Tektro front & rear brake levers

**Bottom bracket:** sealed bearing cartridge

**Head set:** Threadless 1-1/8" bearing sealed cartridge

**Seat post:** Aluminum Ø27.2mm, 300mm

**Pedals:** road

**Tires:** road 700x30c

**Chain-guard:** polished aluminum

**Mudguards:** polished finish 700c 37mm

**Racket:** silver stainless
Appendix C

1. SR SUNTOUR www.srsuntour-cycling.com

2. TANGE SEIKI www.tangeseiki.com

3. KMC Chain Europe B.V.
   Tel: +31-513-650690
   Fax: +31-513-650740
   E-mail: info@kmccchain.nl
   Website: http://www.kmcchain.nl

4. Sturmey-Archer Europa NV
   1101 GE Amsterdam
   Tel: +31 (0)20-609-0221
   Fax: +31 (0)20-609-0211
   info@sunrace.nl

5. IDEAL BIKE. www.idealbike.com.tw

   www.idealeurope.pl/
   idealdg@idealbike.com.tw

6. EVO www.evo.com.tw


9. Caribou-bike www.caribou-bike.com

10. Tange www.tange-design.com/

Figure 9: Jeppsson homepage site 1

Figure 10: Jeppsson homepage site 2