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# How Lean Transformation Projects can succeed:

The key factors acting during  
the interaction between  
consultants and customers

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Thinking employees make a company competitive.

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# Introduction

This dissertation is the result of the study and analysis of the interaction between the consulting company and the customer company who is asking to change. The goal has been to find and highlight the key factors that before, during and after the development of a lean project, are able to determine its success. These factors include therefore a wide spectrum of aspects: on one hand, personal and relational components among people; on the other hand, the pre-existing organizational and structural component of the companies is fundamental, as is the technical level of complexity of the project itself.

The theoretical framework chosen to analyse and discuss these issues is the literature on the Toyota Production System and Lean Thinking, as they fully frame the context of action of a lean project. For its particular nature, a lean project is global, it does not involve just a specific function, a department or a single-assembly line in a company. Those examples can be the starting point, the entering expedients that make people understand the great potential of this different way of thinking. From that moment a company can decide if starting a path of full transformation with the goal of achieving just an advantage on a single unit or process in the whole enormous container of activities that being a company involve, or if continuing a path towards continuous improvement. Obviously, everyone is free to stop himself or herself at the first failure or success, but it means missing the big opportunity to grow continuously and be more competitive. Some companies understood by their own this great opportunity and continue following this path from the intern, others think that starting a "kaizen" worksite is just something new and they don't perceive its great potential. As literature testifies, lean or TPS based projects are more and more common all over, from the moment Toyota opened its doors to the world. One of the main reasons that brought a lot of lean transformation projects failing during the last fifty years both in big and in small companies in the world, has been the absence of culture. Jim Collins talked about "two complementary forces -a culture of discipline with an ethic of entrepreneurship- that together get a magical alchemy of superior performance and sustained results" (Jim Collins 2001: 121). In Toyota there is correspondence with the importance posed on people, that made it totally agree to open its plants to the world after its great success, sure that none could have copied their success. That success came from a different way of thinking that puts the human ingenuity at the first place, in order to achieve improvement. The particular essence of these projects makes them difficult, because changing minds is needed first.

References about how to introduce lean logics into companies and about how consulting companies approach lean projects have been taken by scientific articles. The focus was therefore put on how to build a positive relationship between consultants and customers, what are the ingredients needed to cooperate, how a common goal should be aligned and settled in order to establish a profitable

future collaboration. The analysis of the literature had the aim to highlight which factors lead to the success of a lean project. Thus, it went deeper to study the factors that constitute a push, a facilitation to the work of consultants and those that lead instead to a blockage or a slowdown of the project. Through an empirical multiple case studies analysis, three actual projects carried out by a consulting company in Italian companies were selected in order to show the influence of those factors in real projects, and how those factors can determine the success or the failure of the project itself. At the end it tried to highlight those decisive factors that could lead, after the success of the project, to the future continuation in the path of improvement by companies without the need for external guidance.

In the first chapter an extensive description of the TPS is provided, with a particular focus on the way in which it has gradually evolved, shaped and adapted as needed. In contrast to the past Taylorism, Toyota Production System is not a top-down imposition of methods and practices, but an invitation to use ingenuity to solve problems. The name is due to the company Toyota where it was created. Although it is based on very simple principles and logics and in some ways on "common sense", many other principles are counter-intuitive, so its development has taken about 50 years. Getting inside people's minds, showing how change can benefit and actually make it, takes time and effort. In the second chapter the methods to enter in contact with improvement projects for manufacturing companies are explained. A particular focus is given to projects developed by consulting companies in Italy. The operational area of consulting companies is therefore contextualized, as well as the way how the projects and the relation with the customer company are approached. The consulting company where the candidate has completed the internship is also presented as a tangible example of how this kind of business works. These characteristics are fundamentals for the analysis carried out in the following chapters. The third one therefore presents the research methodology used to choose the most relevant key-factors in determining lean projects' success. This choice is the result of the combination of several scientific sources regarding lean principles introduction into companies and relational and technical approach of consulting companies to projects.

In the fourth chapter three real cases of lean principles implementation into companies are presented. They show how the key-factors act in different projects and in different companies. The focus is put on their huge impact on the final result. After that they are critically analysed to outline the differences and similarities among the cases selected. Each key-factor can be present or not and depending to this, there are some consequences for the consultant and the company. Underestimating those factors can be very damaging. The results achieved show that the factors explained above are common and can be found even in other different projects that haven't been analysed during the dissertation. The reason is that, although different from each other, all companies are composed by people. All the macro-themes highlighted are transformed into critical factors of success or failure depending on whether it can instil in people the desire for change and improvement, if it is successful in involving and motivating to solve problems. This means that people

are fundamental in all projects. As they are totally different from each other, what will change is the approach used to "get them on board" the project, but the determining factors both in positive and in negative remain the same ones. At the end of the chapter a final pattern is perhaps developed. It takes back the common structure of consulting projects and show which factors can be found in every phase of the project. In this way, the consultant knows where putting much attention and has a guide to deal with them along the work.

# 1. Introduction to Toyota Production System

When it talks about Toyota Production System, it is discussing of great results and improvements. TPS is a system designed to completely eliminate waste from companies' processes and increase production efficiency. It is based on a continuous propensity to improve, which led Toyota from a small industrial reality in 1940 to become one of the first car manufacturer in the world. This incredible growth in relation to the global operative area of the automotive sector is the first irrefutable proof of the value of the method, supported by many other cases in every other area and reality.

In their second book two important researchers told the incredible results they have seen and studied: the conversion of a classic production system to batches and queues in continuous flow with pull by the customer can double the productivity of the plants, cutting production times by 90% and reducing stocks by the same percentage. Errors in reaching the customer, process waste, accidents at work, time-to-market are drastically reduced. It also reduces capital investment (Womack and Jones 2003).

From the 1970's people are studying and implementing TPS principles inside companies. In order to understand how it has been possible to develop a system that allows such results to be achieved, it is necessary to retrace the path from the birth of the system to its development. It has gone hand in hand with that of the Toyota Motor Company, on which it has been built and modelled little by little. To begin with, it is important to understand the context in which the company operated, and from which the seed of change was generated.

## 1.1 The historical context

Frederick Winslow Taylor (1856-1915) was an American engineer and entrepreneur. He was the forerunner of the study of methods for improving production efficiency. His theory is contained in the book "The Principles of Scientific Management" published in 1911, where the principles are exposed. Taylor tried to analyse the work in a structured and scientific way by defining a "One Best Way" for doing every activity. His thinking is based on the belief that it is possible to eliminate from the work of an operator all the slow and useless movements by identifying the best movements, fast and useful, to do the same work in less time and more effectively. There is only one efficient way to perform a given activity that is defined by the management and this mode must be repeated in exactly the same way. Basically, it was looking for a high horizontal specialization of operators with small

and repetitive tasks under the continuous control of supervisors, people dedicated to the division of labour and optimizations. The management, no longer the production with its specialized workers, became the centre of the factory, ensuring maximum productivity of man and machines (Taylor 2004).

Scientific management was hovering at the beginning of the 20th century without finding relevant practical applications. This happened until Henry Ford (1863-1947), an American entrepreneur and founder of the company of the same name "Ford Motor Company", came into play in 1903. Ford had as its goal the construction of simple and low-cost cars for the mass market of middle American families. This meant overcoming the handcrafted production that had prohibitive costs for the middle class. Starting from Taylor's concepts, Ford understood that the key for achieving his product idea was in manufacturing procedures and he was the first to design the series assembly line, which radically changed the industrial world of the nineteenth century. The basic idea was to make the product slide inside the factory rather than the well-known fixed station production: connecting the machine frame to belts allowed the continuous and effortless movement of the car while it was undergoing the various stages of assembly. Teams of workers positioned on board the line performed specific operations in predefined ways they could not deviate from. In addition to the assembly line, the concepts of interchangeability of parts, that is the standardization of components within the product and the ease of interlocking, were fundamental, with the aim of facilitating assembly operations with additional benefits in terms of time and use of personnel. The iconic model product that represents this period is the Ford model T. The car reached more than 15 million units, most of which were produced in the same parts, engine, accessories and colour. This meant that there was no customization or choice from the customers. Ford's famous phrase was: "any customer can buy the car he wants as long as it's a black Ford T" (Ford 2007: 24). The plant contained a production line about 13 km long and started from the extraction of raw materials and ended with a Ford T at the exit every 49 seconds. About 100,000 workers carried out the necessary operations in a predetermined manner and at a predetermined time. It was called the eighth world wonder (Ford 2007).

Subsequently, the former managers of Ford led by Alfred Sloan founded General Motors in 1908, another historic American car manufacturer. A competitor operating with an assembly line and a greater variety of products was born. Sloan understood the evolution of needs and diversified the production in different brands including Cadillac, Buick, Chevrolet, Pontiac, Oldsmobile applying the knowledge developed in Ford. In a short time, GM overtook Ford for the number of units sold, responding much better to the market.



## 1.2 TPS Evolution Macro-Steps

In this paragraph a step-by-step approach will be used to explain how it was possible to create the TPS. In each of these steps, a piece of what TPS was becoming is added, tested and built. Everything came from necessity and needs. In the moment that problems arose, ad hoc solutions were tested and improved in order to solve them.

Sakichi Toyoda was the founder of Toyota Industries Corporation, a not very large company that operated mainly in the textile industry based in Japan. Between 1922 and 1924 he invented the automatic chassis. In 1930, Sakichi entrusted his son Kiichiro with the dream of dedicating himself completely to the country, building cars. He allocated the million yen gained from the transfer of the automatic chassis patent to a foreign company to be spent on car research. The Toyota Motor story began in this way. After much research on Ford and GM, in 1933, Kiichiro wrote that his collaborators and him had to learn from the mass production system of American style, but without imitating it excessively. Toyoda thought it was necessary to create a production system suited to the situation in the country, which enhanced the spirit of research and creativity. The seed of the TPS was already born from this thought and from the principles behind the automatic frame of his dad. Toyota Motor Company was founded in 1937. Kiichiro, as president, launched the goal of reaching the level of America in 1945. Doing it in three years became one of Toyota's goals. The picture was clear: by the end of the 1940s, Toyota Motor Company had produced, in its 30-year history, half the number of cars that the Ford Rouge plant had produced in a single day, 2685 against 7000 (Ōno 1988). Just this data was leaving no room to success. But the management had a clear objective. The context of application was a production facility of a company in crisis, with a low level of resources, that had to find a different way to compete against much bigger and richer competitors in America. A new solution was needed, made specifically to be applied in a country that did not have the possibilities that America had. Starting from the Koromo plant, Kiichiro had abandoned batch production to introduce the flow production. What was needed was producing every day and only in the necessary quantity. The warehouse was no longer needed, and it was possible to sell even before paying for the raw materials. The Just in Time was born. Kiichiro developed over time a detailed guide so that employees could fully take over the new concepts of flow operations. The control officers were also assigned the task of improving the machinery, systems and equipment. In this way, quality is achieved in the processes.

The principles underlying the TPS are embodied in The Toyota Way, a set of principles that defines the organization's philosophies. All these principles and logics were born with the progressive entrepreneurial mindset of Sakichi and his son Kiichiro Toyoda. They have been carried out and implemented in Toyota by Taiichi Ōno. He began the challenge of realizing the TPS in Toyota's and

its suppliers' plants (Wakamatsu 2013). The following macro-steps are useful to give important indications about the evolution and development of the system according to the historical context it derived from. They are extrapolated from an interview made to Ōno and published by the Lean Enterprise Institute in 2009. According to this interview, they are set in eight macro-steps (Shimokawa and Fujimoto 2012).

### **1. Wartime Production**

At the beginning of his work, Ōno was responsible for making textile spinning production more efficient in Toyota Industries. After several growth attempts further gains in productivity were hard to come by in the textile work. The automotive division of the company otherwise stayed still behind and the production system developed for spinning work could have been applied to it. Thus, Ōno moved over to the automobile company, as a factory manager in 1943. In that period, Japan was at war, and the factory was converted to military applications. The country asked Toyota to increase production in support of the war effort.

### **2. Post-war Productivity Growth**

After the war, Ōno moved to Toyota Motor's Koromo plant and became responsible for vehicle assembly there. Ōno started to impose an opposite approach as usual. He said the key of success was producing low-volume items in-house and buy large-volume parts, that anyone could make inexpensively, from outside suppliers. In this way high unit costs of making the low-volume parts in-house would have meant great pressure to tackle kaizen improvements and cost reductions. He was applying the just-in-time logic in in-house operations and it was as important as dealings with suppliers.

### **3. Production Restraints Precipitated by a Financial Crisis**

Ōno and his colleagues succeeded to raise automotive productivity five or six times from the beginning. It was 1950 and Toyota Motor Company was able to turn out 1,000 trucks a month. Unfortunately, they couldn't sell all those trucks, and they ended up with a heap of unsold vehicles. The company was on the verge of collapse. Management announced a restructuring plan in 1950 that included job cuts. That was an extremely tough time for Toyota. Only a helping hand from the military had kept Toyota afloat that time. A new management of the company tried to push the logic of TPS deeper and deeper. The post-war financial crisis had taught a lesson to Toyota. They knew that simply raising productivity was no cure at all. That aspect didn't mean

improvement without reducing costs and limiting production to the kinds of products sold, in the amounts they are sold, and at the time they are sold. This one was a strong prove that American-style mass production was unsuitable for Japan.

#### **4. Production levelling**

One of the most important steps to complete such system transformation was levelling production in the front-end processes while supervising final assembly, according to Ōno. He was appointed manager of the machining shop at the Honsha Plant in 1946. He started introducing standardized work over there. This was the first step for changing logics because it meant building a framework for kaizen improvements. Any job had to be split in the respective work standards. Indications were not contained just in employees' mind. In this condition, one improvement after another was possible to be undertaken. Everything could have been measured and improved. After that he finally got the chance to start experimenting with levelling. Purchasing and production levelling were completely by 1950. Some other important aspects were introduced: increasing number of machines with same number of operators that were trained, the importance of the layout that positioned the equipment in line with the workflow. Operators became important and made possible switching from multimachine handling to multi-process handling. It meant letting operators move from task to task according to the flow of work among different processes. Higher priority was given to the utilization rate for human resources than to the one for equipment. From this moment, the emphasis at Toyota was on cultivating people's skills.

#### **5. Productivity Gains after the Korean War**

Limiting production to the amount of goods sold took hold after Toyota's financial crisis of 1950. When the Korean War broke out, production capacity was about 900 trucks and 60 passenger cars a month. The new customer of Toyota was the U.S. Army Procurement Agency, who asked for a big amount of a different kind of trucks. Toyota didn't have the financial power to invest much in new production equipment and management was not about to hire more people. So it was necessary to find different ways to increase output with the same equipment and without increasing the workforce. In 1954 production capacity was 3,000 trucks a month, 10 times higher than it had been 10 years earlier. This great result was possible thanks to improvements in the production system. At the end of 1956 productivity expressed as units produced per person per day, at Toyota's engine plant was higher than productivity in General Motors and Ford engine plants.

## **6. Demand variation**

After the Korean War ended the focus of demand shifted. Japan slipped into a yearlong economic slump in 1957 and demand for large trucks plummeted, while demand for smaller trucks rose. Demand for passenger cars fluctuated repeatedly. They deal with demand fluctuation and unpredictability by continuing to restrain production making only what was selling, only when it was sold, and only in the amounts sold. Rising demand enabled them to keep increasing production, but it shifted their approach as much. They left the production line for large trucks as it was and expanded production capacity on the line for small trucks. In the same way people were moved to the small-truck line from the big-truck line. Differently from in the United States, the Japanese market asked for a variety of products and in small quantities. Toyota understood that they were subject to sharp fluctuations in demand and organised itself to deal with it. On the opposite, the huge U.S. market supported large and more-stable demand. They manufactured only a narrower range of models at each plant.

## **7. The introduction of Kanban**

After the war, Ōno resumed Kiichiro's work temporarily interrupted, and began to apply the kanban in the factory of Motomachi. The Kanban system was firstly used after 1955 in this plant. Once the system was working smoothly, it was showed even to their suppliers. People were encouraged to apply it in their operations and kanban spread all over. But the system took a while to really take hold throughout the company. The first application was in the upstream stamping processes in Toyota, including work at suppliers' plants. Motomachi was the first Toyota plant built specially to produce passenger cars, and it contained a full range of processes, from machining and stamping to welding, painting, and assembly. This wide range of activities made the system useful to be implemented there. In 1962 Ōno became responsible for all Toyota plants and starts to extend kanban in all other plants.

## **8. The use of Jidoka**

Another important element of TPS has been introduced in the late 1960s. It's the line-stop system created to solve any occurring problems without generating scraps. It was another strong difference with the American system to manufacturing whose emphasis was on keeping the line moving as fast as possible. For Toyota and Ōno keeping the production line moving was the result of many years of kaizen, not a starting condition. When any problem occurs, the line had to be stopped in order to produce zero defects and take a proper action and avoid the problem to come up again (Shimokawa and Fujimoto 2012).

As the table below shows, GM's turnover in 1965 was 60 times higher than that of Toyota. GM's costs were half those of Toyota. During the path of change, Toyota took these daunting data at the beginning of its journey, with the aim of reaching and surpassing its competitor.

Figure 1. Comparison between GM and Toyota in the period 1965-1990

	General Motors			Toyota Motor Company		
	1965	1990	Growth	1965	1990	Growth
Turnover (Mld)	7.452,0	18.066,5	2,4 times	123,9	8.564,0	61,1 times
Net Profit (Mld)	756,0	289,8	-	6,1	329,6	54 times
Employees	735.000	510.000	-	23.000	73.000	3,2 times
Cars produced (Mln)	5,7	4,1	-	0,5	4,11	8,7 times
Investments (Mld)	750,0	637,5	-	30,0	606,9	20 times

Personal elaboration. Source: *Hitozukuri e Monozukuri: Saper fare azienda secondo il Toyota Production System*

If it has been successful, even in one of the most complex sectors in the world, is a strong proof that the initial gaps can always be filled if it uses ingenuity and determination. When the management was confronting the insiders, they wanted to know how far behind the competitor and how much more, every day, they were approaching the goal. Eiji Toyoda, Kiichiro's cousin, became the new president of Toyota in 1967. Through many trips to the United States, with the help of Taiichi Ohno, he tried to give a new spirit to the company that would allow it to overcome the moment of difficulty. The purpose of the various trips was to copy the American production model, still considered the best for making cars. In the USA, in addition to the assembly line, excellent management and production techniques were born, such as quality control, total quality control and industrial engineering methods. Eiji Toyoda was chairman from 1967 to 1975. After 1975, when Toyota began to increase its production of cars, orders of components to suppliers outside the Toyota group increased significantly. In order to understand and apply the TPS internally by each company, great efforts were needed from Ōno. More than thirty components companies were involved in this phase, giving a strong impetus to the Japanese automotive industry.

The productive record of 4.21 million vehicles/year is dated to 1991 (Wakamatsu 2013). The development and continuous improvement of this system has made possible for Toyota Motor Corporation to be the second passenger car manufacturer for units sold in 2018 and currently in the second position in 2019. The table below shows the global data and car manufacturers groups ranking based on the results collected by a market intelligence and consulting firm specialized in the automotive sector. These data enable to confront automotive groups between each other and see the variations in units sold from 2018 till nowadays.

Figure 2. World car manufacturing groups per units sold (data updated to 23/09/19)

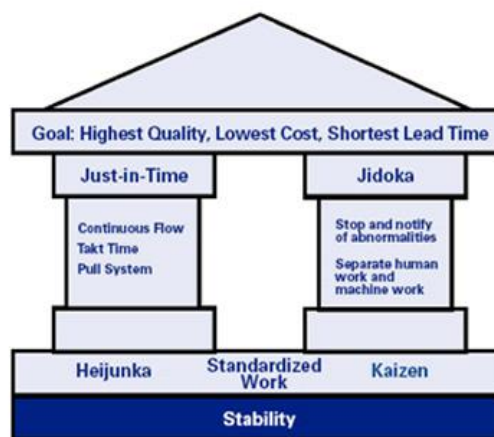
Rank 2019	Rank 2018	Group	Sales YTD July 2019	Sales July 2019	'+/- YTD 2019	'+/- Jul 2019	Share YTD July 2019	Share July 2019
1	1	Volkswagen Group	5.935.736	866.711	-5,5%	-1,4%	12,1%	12,9%
2	2	Toyota Group	5.633.174	841.615	2,0%	2,1%	11,5%	12,5%
3	3	Renault Nissan Alliance	5.291.911	705.573	-6,9%	-5,1%	10,8%	10,5%
4	4	General Motors	4.381.308	597.450	-11,5%	-4,5%	9,0%	8,9%
5	5	Hyundai-Kia	4.133.614	599.550	-3,7%	3,8%	8,5%	8,9%
6	6	Ford Group	2.910.318	403.438	-9,9%	-3,2%	6,0%	6,0%
7	7	Honda Motor	2.805.918	400.393	1,5%	0,8%	5,7%	5,9%
8	8	F.C.A.	2.588.625	351.732	-5,6%	-4,1%	5,3%	5,2%
9	9	P.S.A.	2.019.944	266.960	-10,8%	-1,5%	4,1%	4,0%
10	11	Mercedes Daimler	1.505.729	215.661	-0,1%	20,2%	3,1%	3,2%

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### 1.3 Toyota Production System

In the previous paragraph the evolution path of the system has been showed. The purpose is now to describe what TPS consists of and what are its principles. Taiichi Ōno describes in an interview the Toyota Production System in a very simple way. All they were doing was to measure the time lag between the time an order comes to us and the time we collect money for it. And then we try to reduce it by eliminating no-added value activities (Shimokawa and Fujimoto 2012).

Figure 3. Toyota Production System House



Lean Enterprise Institute

The system is based on making a company stronger by reaching a higher level of efficiency than its competitors. This goal is achievable by eliminating any kind of waste. The inventors of this system thought that people who work every day in the company are unable to see actually how many wastes are in front of them, just because they used to work in a certain way. Thus, the first and fundamental step is making wastes visible in each department and making people aware of the reality. Everything that is not needed has to be highlighted. Just acting in this way, it is possible to face with and reduce considerably inefficiency. Thus, the elimination of wastes can be considered as the first principle of Toyota Production System. It is not directly written in the Toyota House, but the guidelines it offers are present throughout every single principle. The literature talks about seven wastes, "Muda" in Japanese. Muda in Japanese culture has an ethical and moral meaning comparable to sin. Everything that exceeds the minimum contribution of machineries, employees, resources, space, time, which are considered essential to add value to the final product or service, are considered Muda. Therefore, Muda is what concerns the use of resources to carry out no value-added activities.

From this point of view, the ability to recognize and see the wastes, so that it can eliminate them is fundamental. "Learning to see" is not simple, but it is the first fundamental step to implement lean transformation (Cappelozza 2009). Waste is divided into seven typologies: waits, transportations, process losses, stocks, handling, production scraps, overproduction. Time wastage occurs when an operator does not perform any work, because he is waiting for a subsequent event. This is the case, for example, when a machine breaks down during testing. To eliminate this waste, it is necessary to improve the organization of the work, balance the activities, starting to think in a one-piece-flow perspective. Transportations regards to all the various material transports that take place inside the factory. Some transport activities, although not value-added activities in terms of the final product, are essential to the operation of the factory. What must be avoided are the activities in which the materials that are taken several times. These activities must be reduced to a minimum, as they lengthen the total crossing time and increase the probability of damage during the various transports. Over-processing in the production area consists, for instance, of over-long start-ups, unproductive attempts by a machine, incorrect material layouts, and hand counting. These are all activities that lead to a loss in relation to the potential development of a properly optimised process. The movements considered as waste are all the unnecessary movements or excessive efforts made by the operators. They are all those that do not add value to the final product. For example, an operator walking through the plant to request instructions is a movement that must be avoided through the creation of processing standards, punctually shared with the workers. Excessive efforts in the same way should be avoided as they put at risk the health of the operators. It is therefore essential to invest time and resources in designing optimal ergonomic solutions that allow people to work in a safer, more rational and waste-free environment. Inventories are the easiest waste to see, as they are physically stationary at various locations, but are often associated with a concept of safety, rather than waste to be eliminated. All the stocks that are not strictly necessary to guarantee a punctual service to the customer, are in fact deleterious, occupy spaces exploitable in other ways, generate other movements, are subject to the risk of obsolescence, take away economic availability to the company, standing still in the warehouse. Defective products involve rework, interruptions in production, increase in lead times and are to be reduced to the minimum possible through hard work upstream, which ensures process quality. Overproduction is considered as the main waste that entails alone other losses like waiting, overstock and materials handling. Usually such activities are considered an advantage to the future work, but this means committing production capacity, resources, materials, and at last money to do something that was not necessary at that time. From this single thought many non-value activities descends downstream. The identification and demonization of these wastes occurred when consumers' tastes, already after the Second World War, have been diversified, and it was no longer acceptable to produce in excess of what the



company could sell, because an unsold product was very likely to be rated zero. All the work done to produce it was therefore completely useless. Costs increased just to store them.

Shigeo Shingo (1909-1990) was one of the reference engineers for the development of the TPS. Here are two of his most famous phrases about the matter above: "80% of the people you ask will answer you that TPS is a system that is based on kanban cards; another 15% will say that it is a production system and only 5% will grasp the true essence of the demand and will answer that it is a system for the elimination of waste". "The most dangerous kind of waste is the waste we do not recognize" (Dillon 2019: 15-19). This statement is strictly related to "Just in Time" logic, that represents one of the two fundamental pillars of the Toyota House. It explains that the company organizes itself and manage people in order to produce the exact product, in the right quantity and in time requested by the customer. The company is seen as a whole, an entire system where each function and each actor take part to a determined and shared process that aims to deliver the exact product ordered with a punctual service. The customer is the most important actor and the company forces itself to deliver the qualitative good requested in less time possible, in order to satisfy the customer and gain a profit.

The other pillar concerns in facing problems in the exact moment they occur, without procrastinating and creating many more inefficiencies. This is possible through "Autonomation", or in Japanese "Jidoka", as automation, the power of machines, combined with a human touch. The principle of Jidoka comes from the conviction that it doesn't have to accept any productive defect but has to deal with it with the utmost seriousness. This way of managing quality has originated from the invention of Sakichi Toyoda's automatic loom. This loom had a system whereby, if the weft threads broke or were missing, the machine automatically stopped and did not allow the machine to go ahead without first intervening and replacing the thread. In this way, no defective parts were made and reach the final customer. This invention was a revolution at that time, since all competitors produced without ever interrupting the loom, then topping up by hand where the defects had occurred. In this way the origin, the cause of the defect was hit, the threads were replaced, and the objective of zero defects was reached. Thanks to this principle, people in production lines know that when they have a problem in one activity and they realize that they will not be able to finish it in the time prearranged, they have to ask for help and other colleagues will come to solve the problem immediately. Correcting the accident in the exact moment it happens is essential to ensure a rhythm and a standard to the process. Stopping and solving the problem immediately, when it occurs, prevents the problem from spilling elsewhere and ensures the quality of the final product. For this reason, in the TPS, it prefers to talk about permanent repair rather than adjustment. According to this logic, it is essential to solve the problem by immediately attacking the real causes of the phenomenon, preventing it from occurring a second time. It is inconvenient to continue producing by applying a temporary solution. A useful technique to find the real cause of a phenomenon is the "5 why" analysis, which allows, by

asking questions for subsequent levels, not to stop only at the secondary outward causes that appear first (Wakamatsu 2011). Another benefit of the jidoka principle is that it reduces waste. If it works in this way, there is no need for anyone to stand still, sitting and watching the machines while they are working. That way it gets efficiency back because all those people can do other things.

The foundations of the Toyota House are as important as the pillars. From the left it can find the “Heijunka”, that means levelling of production. It is based on making the production system as efficient as possible. It is essential to balance products and production flows and to organise the work of plants and operators along production lines with clear logic. Once it levels production, to completely eliminate stocks a useful way is to set up the Kanban system. It is the tool introduced by Ōno, born on the idea of the first American supermarkets. The downstream processes in the production flow are the customers, who pick up the necessary quantity from the shelf according to their needs. Subsequently, the upstream processes only fill the space left empty in the shelf. The goods are therefore only produced according to what can be sold. This concept of market-in implies the constant presence of customer needs within the processes and mechanisms of the company. The operation of the kanban system is based on the use of tags (kanban) placed between physical warehouses (supermarkets), picking tags, and machines or processes, tags of replenishment. When a process is picked up downstream from the supermarket, the first tag is used to issue the second production tag. In this way, the upstream production process generates the quantity corresponding to a product label, which fills the empty space left by the initial withdrawal. Therefore, this tool works in parallel with the Heijunka to level out production and allows only the minimum stock level, which is dictated by the consumption of the downstream process, to be kept (Wakamatsu 2013). “Standardized work” expresses the importance of having standards in all operations and in all business processes, so that everyone is clear about the activities to be carried out and everything can be measured. Having standard operations means having a reference point defined and shared by all. It indicates the most efficient way to produce, procure and distribute systematically and without waste. The fundamental elements to have standard operations are the "takt time", the operating procedures and the available stock. Takt Time is the rhythm at which the market places orders, and indicates the pace at which production must be calibrated to meet market demands. Having this information at disposal is essential to know at what level the company needs to calibrate all the processes. Operating procedures are the way and the precise order in which an operator carries out the various activities. The stock at ready availability indicates the work in progress (WIP) or the amount of material in progress considered necessary between the various processes during the course of operations. Once the best way to carry out activities has been established, is important to ensure that this way is sustainable and implemented by those who carry out these activities. Precisely defined standards help to improve quality, safety, operational efficiency and facilitate cost reduction. It also presupposes the sharing of problems encountered by those who work and the

possibility of improving these procedures (Wakamatsu 2013). In contrast to the American model, those who carry out operations have the opportunity to operate on the basis of their own experience and are not strictly subject to top-down imposition. Having the reference point of standard operations, operators have the task of reflecting on and improving their way of working. It is they who carry out the operations, so it is they who, thinking about it, can understand how to improve them. That's where the final foundation comes from. "Kaizen" underlines the importance of improvement and continuous change, both as a logic of never interrupting the path towards adaptation and improvement of the company, and as a practical tool for constant and targeted intervention when a problem occurs. The ingenuity of people is fundamental in these activities. This part will be discussed later.

Last but not least, the main focus all over the system is the final customer. For this reason, it can be found on the top of the House. The goals are in terms of quality, to offer the best possible product, and in terms of service, to make shorter the lead time of the product. Everything is structured in order to satisfy a need. Production is pulled by the end-actor, all the phases are set as a continuous flow in order to make the process shorter and serve the customer on time. This means that the company starts to produce the final good just when it's necessary to deliver it on time. All the phases inside the process, from the receiving of the order to the delivery of the final good, have to be clear and quantified to reach this goal. The concept of "takt time" explains this logic: the production process is organized as a whole, without waiting times, and all the single phases are optimized in order to respond to the lead time requested by the demand. To conclude, as a prerogative of the company, everything said before must be done at the lowest possible cost, to ensure a satisfactory profit. This means that the fight against waste, the reduction of the costs mentioned above, are fundamental elements and close the cycle of the system.

Nowadays it hears about "Toyota Profit System" instead of Toyota Production System, because what was born a long time ago in a productive area is not strictly relegated to it. It concerns a different way of seeing and thinking to the company. It means is not just a collection of distinct business functions, but a single actor, a whole where everyone is part of it and take part with its job in order to add value to the final product and ensure a profit to the system. That's why all the principle shared with the world by Toyota are applicable to all the processes and group of activities that are related to a company, from offices to operative units. In Europe, it is more common to hear about "Lean Production" or "Lean Manufacturing" than about TPS. This concept comes from "Lean Thinking", which has been explained as searching for waste and eliminating it in order to produce more with less resource consumption (Womack and Jones 1997). It is the result of the work of rethinking and adaptation made by American consultants during 90'. The term lean was proposed in 1987 by John Krafcik, a researcher at MIT, to indicate the characteristics of the production system, product development, supplier relations, customer service, quality and management methods of Toyota and other Japanese companies. The term appears for the first time in James Womack and Daniel Jones'

second book "Lean Thinking: Banish Waste and Create Wealth in Your Corporation" of 1996 following their first book "The Machine that Changed the World" of 1988 that made visible worldwide the production and organizational revolution started in 1950 by the Toyota Motor Company (Womack, Jones and Roos 1990). They succeeded to bring the Japanese philosophy into the West, and they give to the rest of the world the principles and the tools to open the doors to innovation into manufacturing. Then, starting from the need to maximize value for the customer and for the company and to minimize waste, they began gradually to expand the areas of application. It was also possible to apply it to the non-manufacturing world, to the tertiary sector, to the financial sector, to the health sector, to schools, to public administration, even to the point of theorizing a lean society.

As well as TPS, the lean approach aims to guide companies through a complex challenge of maximizing efficiency, in terms of cost and productivity, and effectiveness, in terms of customer service and product. These two objectives seem to be distant and opposing but are strictly related to the health and success of a company. A company that follows the customer perfectly and guarantees excellent products, cannot ignore the respect of cost and efficiency targets to continue to stay in the market. In the same way, a company that works well from the point of view of production, must not lose sight of the needs required by the customer. For these reasons, this model is based on achieving both. The Lean Model is based on 5 principles:

Figure 4. The Lean Model



*Lean Thinking: Banish Waste and Create Wealth in Your Corporation*

1. **Value.** It is the first principle because it reflects the first question to be put: “what is the value for my client?”. It is the main objective to be pursued, because if the company will achieve it, the more it will increase the value of the company itself. To do this it is necessary to change the way of thinking and seeing the traditional company. No longer a company is designed for separated, disconnected functions, but with a new vision for processes that are transversal to all functions, which are all aimed at optimizing the flow of processes along the way. Value must be rethought from the customer's point of view. The first step is therefore to listen to the customer and understand the relative needs. Only after having understood the specifications of use of the product or service requested, will the company derive its final offer from these. Designing a solution and expecting it to suit to all the customers is now part of a world that no longer exists. The increasingly rapid change in tastes, needs and requests of customers means that the initial process of sharing and communicating with them is becoming increasingly important. Therefore, all the activities carried out in that moment with them, such as knowing, understanding, listening, measuring, developing and managing, become key. In order to acquire a strong production capacity, it is necessary to constantly ask oneself: "Who is the client for me?" (Wakamatsu 2016). The customer changes constantly as society changes. It means that the company has to abandon a production-centric model and proceed by changing the production system to a customer-centric perspective.
2. **Map the Value Stream.** Once the starting point has been established, i.e. the value for the customer, the company must identify the value stream, the set of processes and activities that contribute to creating this value. To do this, it is necessary to map the physical and information flows through the company. The result is a value stream mapping<sup>1</sup>, which provides a clear and visible picture of the current state in which the company works on a daily basis. From this basis it is possible to identify all the wastes and the actions to eliminate them, building an objective, future flow. In practice the first step is to identify which are the value-added activities, the non-value-added activities but necessary and the non-value-added activities that can be eliminated. After that, waste can be attacked, and the company can concentrate itself only on value-added activities.
3. **Flow.** After eliminating waste, the goal is to keep the remaining value activities flowing without interruption, making them as simple and fluid as possible. It means removing barriers between phases and getting organized around the process. This creates a flow that reduces

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<sup>1</sup> This is a fundamental analysis technique that is used in many improvement projects.

lead times<sup>2</sup> to the customer. The length of the flow has to be shortened to the minimum necessary and it's possible maintaining only the processes and activities that add value to the final product. To exploit the most this transition, it is necessary to move from a traditional departmental organisation to a continuous flow one. This eliminates stock between single phases and inside the overall process. Operators become multi-functional and give flexibility to the company.

4. **Pull.** So that the final value perceived by the customer is higher, the company no longer produces and moves goods according to internal optimisation logic, but only to the quantity and in the time requested by the customer. Production and all other business processes must adapt to follow the takt time of the market. Following the takt of the market, means to let out each piece in the time needed to serve the customer. It no longer produces to fill in the warehouse, but only according to a demand from the market. The result is a reduction in stocks of work in progress, space used and resources. Doing this is difficult because it means calibrating oneself to something that changes frequently. It is therefore essential to have a production flow able to adapt to the needs. There are many tools that allow to cope with the difficulties of a continuous flow management because they allow to control and level production. Some examples are the Supermarket, the Kanban system, the Heijunka box.
  
5. **Perfection.** This process has no end. The steps of the lean path make up a circle, so when it finishes an improvement, it returns to the first step of the path in order to improve even further. This means that the processes of cost reduction, space, waste never end, the company does nothing but identify another point to improve and then works to do so. This drive for continuous improvement can also be represented by a straight line with uphill steps. A useful methodology for organizing projects of this type is the PDCA cycle. It is divided into four phases: plan, define an objective and make an improvement plan; do, analyse the current situation and find solutions; check, check the results and decide on recovery actions; action, activate the plan and prepare the next steps.

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<sup>2</sup> Lead time means the time between the moment where the order arrives from the customer to the one where the final good is produced and delivered to the customer.

The last concept of the Lean Thinking model, that is seeking perfection, has been stressed much since the strength of Toyota has been the willingness to never stop and contemplate the results achieved. Ōno explained to his collaborators that even after hundreds of successful “Kaizen<sup>3</sup>”, it must not stop and look to the past or the future. It is essential to focus on the current state because it is still full of waste and can be improved. The spirit is to do kaizen every day, a benchmarking that has no end. Perseverance is the element that allows the company to get to the top. The basic concept of the kaizen is to make the workplace as comfortable as possible for people in the “Genba<sup>4</sup>”. A comfortable environment facilitates the proliferation of ideas. Therefore, the lean model has been very effective in giving the right tension to continuous change. All the techniques that allow to make a plant efficient are well explained. However, even if Toyota Production System principles have been well translated and adapted to the Western context, there remain some doubts about whether the Western world has fully understood the true nature of the system. Those principles came from the culture of Japan, a land where values such as human dignity, commitment, dedication and humility are fundamental elements in the life of all people. They represented the basis where a system of constant commitment, thrift and attention could have expanded.

“This production system was born in Japan because it probably could not have been born elsewhere” (Wakamatsu 2013: 21).

This phrase was pronounced by Ōno and explains the thought of whoever fought for the system to take root. For this reason, when companies implement those principles, it's not obvious that they reach the goals they expected before. Sometimes, during the first approach to TPS, some companies make the mistake of focusing too much on the tools it provides. Tools and methodologies change very quickly, and they require instead to be extremely adaptable to the business environment where have to be applied. In essence, it often starts from the study and application of those tools according to the rules or following an example of success, while the right approach is actually to study, understand the reality, and after that choose and adapt the best tool to achieve a precise goal. Basically, when it talks about TPS, there is a tendency to easily misrepresent it, identifying it in a technique or a methodology, while what really matters is the way it looks at and thinks about things (Cappellozza 2009).

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<sup>3</sup> Kaizen is the improvement activity that is undertaken by a team when a problem arises or when a possibility of optimisation is identified. They are organized into "worksites" and are carefully analysed and measured because, one after the other, they are the seed of change.

<sup>4</sup> The Genba is the place where activities take place and where value is created. In manufacturing it is therefore the factory floor.

Tools must be put at the service of people, understood and used to achieve a clear objective. If they constitute an obstacle to their work, the opposite effect is obtained. In the same way, the change must be adopted because all the resources in the company, from the top management to the operators, have internalized the essence of TPS and have understood that the first to change behaviour and seek improvement, it must be them. Thus, it should never make the mistake of putting methods first. What is missing in the Lean model is what Toyota considers as the main ingredient, fifty years ago like nowadays. The importance of having people that are able to think, at all the levels. People that with their intellect are able to push the company toward the future. Continuous improvement consists of its true competitive advantage. This means that the 5<sup>th</sup> principle of Lean Thinking necessarily needs people's involvement and motivation to be carried out. People will therefore be the real architects of improvement in the company. That's why people in Toyota talk also about "Thinking People System", instead of Toyota Production System.

"The Toyota Production System is a system designed for humans" (Wakamatsu 2013: 5).

This is a famous statement that summarizes the essence of the method. It is based on the attention to the development and growth of human resources employed in the company, rather than the optimization of plants and tools. It is the man who governs the improvement and development of companies and makes them more and more competitive facing the evolution of the market. Taiichi Ōno used to say it a lot of times to his staff. He used to repeat phrases such as "human ingenuity is fantastic", the fundamental element of TPS is "to valorise people", several times. Therefore, the key to success lies in having created an environment that places the person at the centre of everything and where it is easy to work. What is most striking are also other expressions like respect for human beings, as such "all people have the right to be esteemed, respected and those who coordinate them have the duty to think about how to make their work easier"; respect for human nature as "respecting people's ability to think" (Wakamatsu 2013: 23). For these reasons he fought every day to leave space to think about each one, he did not say what to do to others, but he wanted people to think for themselves about how to solve a problem, devising solutions, that were not imposed from above. In this way people become able to look at reality with their own eyes, to understand and solve problems in the future. As a result, he blamed employees for doing the opposite with other people. Everyone in the company had to be able to contribute. The result of investing every day in the training of people is a system where people are more flexible and allow, from the practical side, to be moved between departments to the need without difficulty, from the strategic side, to adapt to increasingly changing contexts and be able to cope with new and unexpected changes that threaten the life of companies.



The substantial difference between TPS and Lean Thinking has been explained. If it uses the term consciously and in the case of Lean Thinking, it remembers to add the fundamental ingredient that are people, both terms can be used indiscriminately. For this reason, both terms are used in the prosecution of the work to refer to the system explained.

Toyota took about fifty years to put all these elements together. It was committed to training a system of staffing that gives importance to the relationship between workers and the company. The relationship with suppliers was also of fundamental importance, since, if it wants to set up a JIT system, it must work closely with them to ensure that they are able and willing to provide the company with the necessary things, when they are needed, in the required time. This system has been its success and will become increasingly important for others in the future. This can be achieved not only in one day, but just through constant commitment and culture. The interconnection between the art of doing things well, that is "Monozukuri" in Japanese, and the one of making people grow and shape, that is "Hitozukuri", is the theme that makes the difference. This means that, in parallel with the ability to think and build a product of excellent quality, to do business, it is essential to grow up people. Only with people, Monozukuri can be reached and only people can make it come closer to excellence every day. Monozukuri cannot be made with machines or plants but is made with those who think and solve problems in the genba on a daily basis. Those who live in genba can and must react promptly, with independent evaluations, to the changes that occur. Allowing them to make decisions avoids having to go through every time for superiors, even for the simplest issues. Some examples of autonomous intervention are the autonomous downtime of the operators, mentioned above, and the daily adjustments to the production mix in response to sudden market demands, which vary with such a time horizon and such a rapidity that the production programs carried out by the offices often fail to follow. By doing so, the genba is able to express its "autonomous nervous system" (Wakamatsu 2013: 220). It is the autonomous evaluation function that allows the genba to be developed towards the market. This is an important benefit for the whole company. If it is ignored, however rigorously the methods have been adopted, the TPS will not bear fruit. In fact, Ōno thought that if there had not been some other form of wisdom, of ingenuity, they would never have been able to win in competition with other companies. Hence the fundamental importance of bringing out "people's ingenuity" (Wakamatsu 2013: 35). With these assumptions it can achieve an excellent Monozukuri. For this reason, Toyota offers its employees a 40-year working life plan that is designed to enable them to acquire all the skills and abilities that are required of them throughout their working careers. An important part of this, in addition to individual skills, are also those of training other people. In Toyota, the heads are the ones who make others win, who support and help others to express themselves and think with their own heads.

To sum up, the main differences between an ordinary production model and the Toyota one, are contained in the following points:

1. From the point of view of turnover, the first focuses on the quantities produced, the second only on those sold;
2. From the point of view of processes, in TPS the upstream ones are considered "gods" and if they are carried out by external suppliers, they become collaborators. The downstream ones are instead the customers and the objective is reaching them without defective parts;
3. The production lines are dedicated to a single product or customer, the plants are at the centre. In the second, the lines are mixed, they are based on following the production takt time and to do so they collect a mix of products;
4. The resolution of anomalies tends to be procrastinated to a future moment when it has time to deal with it. In the second, they are managed and resolved on a daily basis;
5. Specialised operators versus multi-functional operators;
6. Improvement activities are carried out only when imposed from above. In the latter case, everyone is dedicated to kaizen on a daily basis and management must support operators who fail to comply with standard operations;
7. In the first case, staff reduction takes on the brutal sense that it is used to think about. In the TPS world it is a question of regulation: efficient production, that is production with as few people as possible. It means that, depending on market changes, people are employed in a line or in a department to cope with a peak or a decline in orders. Always working in the same way, for the same time, varying the number of resources used according to the needs and moving those in excess to do other activities means recovering efficiency (Wakamatsu, 2016);
8. A standard production logic is intended to reduce waste by reducing set-ups to the minimum and producing large volumes, but it ends up generating others resulting from the management of unnecessary stocks. With TPS, batches are reduced, set-up times are reduced thanks to kaizen activities and the skills of multifunctional operators. Because it can make setups quickly, it increases the number of fixtures to meet customer demand, producing only what's needed. It lowers the overall costs incurred by the company.

The system that has been explained so far, as Ōno claimed, is a "management philosophy" (Wakamatsu, 2016: 56), not a methodology. It is a rigid system in the framework, in the fight against waste and problems, but flexible in the small and continuous adjustments. The strength of the system lies in having a strong, thinking genius that can make changes on its own in response to market changes.

"We can't say yet that the TPS has been completed".

"Kaizen's activities must continue at all times and without limits".

"First and foremost, it shapes human beings." (Wakamatsu 2011: 54-55)

These words of Taiichi Ōno explain one of the fundamental points to introduce and make the TPS spread in the company. People give a continuous boost to improvement and prevent the company from stopping to contemplate what has been done so far.

## 2. TPS introduction in companies

This second chapter refers to the interaction between TPS or lean thinking logics and companies today. It explains how companies come into contact with improvement projects. One of the possible ways is through the relationship with a consulting company. In this case, the external company becomes the bulwark of the TPS within the client company. The objective of this second chapter is therefore to explain how the interaction between these two bodies in general takes place, how they come into contact and start undertaking an improvement path together.

In the first paragraph, attention is gradually shifted from Japan, where logics was born, to Italy, which represents the operational context of the dissertation. As has already been said, the world of consultancy will be presented and the role it plays today in conducting improvement projects in companies is explained. In the second paragraph the consulting company where the candidate undertook his apprenticeship and the way it operates are also presented. In the final part of the chapter, the way how lean logics are introduced into companies is explained through the reference to some scientific articles.

### 2.1 TPS and consultancy

Nowadays more and more companies are struggling to gain market share. If a brand disappears, another one immediately appears ready to take its share. So, if it wants to compete internationally, a lot of characteristics are needed, like good product quality, punctual service, increasingly short delivery times and lower and lower costs. The demand has become increasingly variable. This means that the life of the products is short and the fluctuations in sales volumes are considerable and difficult to predict. It often occurs that what is sold today can no longer be sold tomorrow. The answer to these requests is product diversification, offering a wider range of products and speeding up the development of new products. This means that a system of mass production and large batches is certainly unsuitable to meet these needs. The result will be an accumulation of goods that can no longer be sold. Under these conditions, it is no longer possible to sustain a business just by pursuing a higher return. On the contrary, thousands of different items need to be produced in a single plant. The answer is building a flexible production system, a monozukuri that seeks efficiency, destroying waste. Doing the same thing up to now is not the best way to proceed, nor is emulating successful models from the past, which are unsuitable for the present. The TPS, on the other hand,

is born from a clear objective: to acquire the necessary competitiveness to defeat the American mass model. It was the drive and the tension towards the achievement of the objective that led the company over the years to grow and create its own original monozukuri system. This would not have been possible without starting a complete and radical streamlining of the company, with an attitude that leads to constantly re-examine everything from scratch. Of course, it needs courage to change and to adopt a way of working it doesn't have experience of. For Toyota, this was the only possible way to succeed, knowing that in a new way of working there was endless room for improvement. The TPS was first developed and applied in Toyota and then became widespread into Japanese companies. The first were the companies where change was brought by Toyota itself. They were Toyota' suppliers, that in TPS are considered as collaborators. Other companies were subsequently attracted by the excellent results of that time. Thanks to the work of study and divulgation of Womack and Jones, it also came in USA and Europe afterwards.

In an article published in The LMJ in 2012, Arnaldo Camuffo, professor of management at Milan's Bocconi University and scientific director of the Lean Enterprise Centre of Italy, CUOA Foundation, told that in Italy the first companies to implement it were Fiat, in the early 1990s, and Snia Viscosa. From that time, important subsidiaries located in Italy of multinational companies, such as Electrolux, Pirelli, Alenia, have also been engaged. With this first wave of lean, the Italian industrial fabric, consisting mostly of SMEs, had not yet been affected. He explained that from that moment on, the importance of the push for improvement in a competitive key was becoming more and more evident among companies. Lean production therefore reached Italian SMEs at the end of the 1990s (The LMJ 2012). The delay in the diffusion of these logics is due to a marked cultural difference between Italian population in question, and the Japanese one. The values that have allowed its extension and proliferation in Toyota, such as the dedication to order and respect, to the natural rejection of everything is waste, are not as easy to find in an environment like the Italian one. It is a population of individualists, of great inspiration and great minds. Where facing a problem, a possible solution is sought on their own. There is a lack of a strict culture of respect for the rules and sometimes waste becomes a vice, rather than an element to be knocked down. On the other hand, the pattern of manufacturing SMEs, which constitute the strength of the country, shares many Japanese culture's characteristics, as the art of know-how and professionalism in exercising one's profession, the attachment to business, the conception of work as an integral part of one's being and one's life. At the beginning, managers and entrepreneurs was looking with curiosity, admiration and suspicion at the results that the first Italian companies were obtaining from the application of this system. Step by step, more and more people have come closer to these principles. The numerous publications about lean thinking that spread over the years have certainly had an impact on its diffusion. A decisive step has also been the experimentation in some pilot projects in their own factories, which accelerate even more its dissemination showing the practical results.

From a study carried out by researchers of the Polytechnic University of Marche in 2016, the Italian manufacturing sector has been analysed. The purpose of the analysis was to highlight how many companies have started improvement projects in lean production. 254 SMEs with a turnover of more than 5 million and belonging to industrial sectors were considered. The study carried out on this sample showed that 37.8%, that are 96 companies, were classified as High Lean Performers, 31.9%, that are 81 companies, as Medium Lean performers, while the remaining 30.3% as Low Lean performers. This classification takes into account four factors that have been evaluated and measured: the relationship with suppliers, the product quality, the production efficiency, the human resources. Each of them has been assigned a score that, added to the other factors, identifies the company in question in one of the three classes above-mentioned. The former concerns therefore companies that show a high attention to lean practices. The latter concerns companies with only an idea of lean logics and how they are implemented in the company (Bevilacqua, Ciarapica and De Sanctis 2019). This means that even in Italy many companies have resolutely approached lean thinking and it is now recognized by many as an important way to raise their competitiveness. Today everyone has heard of lean thinking. The first projects carried out in Italy concerned the traditional area of the factory, such as the productive area, which is restricted to the context of lean production. They then extended it to the entire supply chain, giving rise to the lean supply chain<sup>5</sup>.

Even though the principles are widely spread, and many lean transformation projects have been carried out, very few companies have understood deeply the culture of TPS and brought these principles outside the production area, up to the offices and other business processes. In this sense, areas that deserve great attention and are far from being considered as such, are product development and all other non-production processes, from commercial to purchasing, administration and customer service. Solutions that can be implemented in these areas are called lean development or lean innovation, and lean office. The former is intended as the application of lean principles to the technical and product development departments, an area that is increasingly strategic and where companies gamble on their competitiveness. From it depends the possible reduction of time to market<sup>6</sup>, the lowering of costs and prices and readiness to serve the market with a wide range of products. The latter concerns the application of lean principles to all other offices, where it is possible to find in the same way, other types of muda that are eliminable to achieve efficiency and greater collaboration with the beating heart of the company, the genba.

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<sup>5</sup> Lean supply chain means eliminating waste and non-value-added activities in order to streamline the processes that involve suppliers.

<sup>6</sup> Time to market is the period of time the company takes to reach the customer with a new product from its designing to the finished product.

There are even lean accounting systems, that is simple and immediate control models that serve to monitor the management, profitability and performance of companies, eliminating the excessive complexity of traditional systems. Merging all of these elements would generate the Lean Enterprise it talked about earlier, which is a complete business system that is lean in every aspect (Cappelozza 2009). It provides a way to do more and more with less and less, less stock, less human effort, less equipment, less movement of material, less time and less space while coming closer and closer to providing customers with exactly what they want. It is the single most powerful tool available for creating value while eliminating waste in any organization (Womack and Jones 2003).

Taking up what was said in the first lines of the previous paragraph, several times it can hear from entrepreneurs and managers a statement like this: "This system may be good for the automotive sector, but it is not applicable in our sector". On the basis of what he has learned, working side by side with Ōno, Wakamatsu explains in his book "Hitozukuri and Monozukuri" how important flexibility of the genba is. The logic on which the TPS is based is to follow the customer: since customers buy cars one at a time, according to their tastes, it would be convenient for the company to manufacture the cars one by one, adapting to the requirements of the same. A production system must be created where not the logic of the manufacturer, but the logic of the consumer prevails. If it thinks in this way, such a system is not only applicable to the automotive sector, but to the whole world of monozukuri. Doing so means responding with flexibility to changes in volumes and types required and allows to make profits regardless of market trends (Wakamatsu 2013). The Italian industrial world, whose competitiveness is very much linked to production specialisation based on high product and process flexibility, is therefore absolutely included in the operational areas where it is possible to activate improvement paths. The advantages that derive from the adoption of the lean system are remarkable, in particular in the production area. This philosophy works with few stocks, anomalies are discovered and eliminated quickly, the relationship of trust and collaboration with suppliers simplify the procurement processes, the presence of a multifunctional staff increases motivation and contributes to improvement, quality and efficiency. On the other hand, some disadvantages are also evident: the risk of having to stop a production line in the case of defects, due to the consequent lack of additional stocks, and high personnel training costs. For this reason, there are cases of companies that have failed to become lean. Sometimes people have not fully understood or forget that such changes require time and effort, as they affect the entire company and all the people who are part of it. TPS starts with the minds of the people who work. It cannot be relegated to production departments or a raw material supply system. Toyota has taken more than 50 years to develop the production and management structure that has today, and it is still evolving. The strength of this system is precisely the fact that it forms people to never stop evolving, to constantly try to improve, as the environment is increasingly changing and unpredictable.

But how is it possible to spread the principles of TPS within companies? How do companies get in touch with this system?

1. One of the most common ways to get in touch with such a system may be the voices, conferences and examples of success from the outside. From this point of contact there are several possible ways that companies can follow in starting the path. A first scenario is the one where the company approaches the single methodologies without fully understanding the system on which they are based, maybe having just observed the way they were applied in another company. In this case, it tries to imitate an existing example and the possibility of a failure or anyway of a very limited result is wide, as the many variables that act in these cases are not considered and it relies on methodologies thinking that they are standard and applicable equally to every case. In the second scenario, it understands the importance of training and asks for support from the outside. This represents the majority of cases how consulting companies' projects start. In this way a lean transformation process with the support of external figures begins. Since the inception of the method, many people have studied Toyota closely and have thus become able to help many other companies around the world to embark on the path of improvement. For this reason, companies turn to the assistance of external consultants in order to find a guide at the beginning and during this long path. The reason is that a consultant can have much bigger experience in these subjects than the company which starts approaching them. The creation of a long and productive relationship between them is very common and it continues for years till the company decides it can go on by itself. This kind of relationship can be found also with multinational companies that ask professional support of consultants in specific big projects that require the advice of external experts.
2. Another way to get the system into the company is taking one or more high-level figure from the outside, that have already experienced such logics elsewhere. Once this presence is strong within the organisation, one way is starting kaizen projects by their own. This is usually the case of the more structured companies. It happens when who is on the top the company has understood the importance and the potential benefits of undertaking this kind of transformation and transmits the intention to change to the rest of the company. Its diffusion and the way how it is done, depend on how important this figure is internally and how much it succeeds in being followed by both the direction and the people. From this moment, most of the companies belonging to this category continue this continuous path each time more slowly because they see improvement activities as important but not vital for the existence of the company. On the opposite, Ōno believed they have to be prioritized because all the small



improvements together, even if they require time in a first moment, then they allow to make the workplace easier and in this way people are able to use their intellect and make the difference for the company (Wakamatsu 2011). Just a few companies internally carry on these projects in the right way and they can see the results. Even in this case it is not excluded that, after having taken within it some dedicated figures and experienced in part the method, it turns to a consulting firm to get additional support, both for a complete path, both for a specific project.

To sum up, there are two opposite approaches to lean transformation, which go beyond how companies have become aware of TPS. Very often it happens that TPS is perceived only as a set of methodologies. The result is that people are forgotten, and only techniques are applied, with limited results. In the best case otherwise, the company experiments with one or more of the tools provided by the TPS through a kaizen project and once the positive results have been achieved, it convinces itself of its usefulness. From this moment, it begins to promote and communicate the new approach within, making sure that the new vision is understood, accepted and carried out by all people. In this way it builds a corporate culture aimed at improvement and working and committing to achieve better and better results.

TPS changed enormously the way of seeing, thinking and even behaving. For this reason, some people show difficulties to embrace it. The direction of the company must help to spread this thought, also availing itself of those who at first put up resistance. Only with the favour and conviction of all it is possible to promote renewal. The theoretical explanations, although important, are not sufficiently understandable by those who work in the field. Those at the top must show patiently how to do, using the force of facts as a weapon. If employees, even the most hostile, see the concrete benefits, they will be less reluctant to change (Wakamatsu 2011). TPS is based on people and people are fully committed to a job they are convinced of. If the company is able to motivate its people, it creates the dynamic environment where continuous improvement can spread and proliferate. One of the most common mistakes that occurs when a company starts its path through lean transformation is that people involved haven't understood what's the real nature of TPS: "Kai-zen" as two different words, "kai", change, "zen", feel better. So, it actually means changing in order to feel better, to improve. Most of the times people are not ready for that and change needs time. For this reason, when a lean project starts, the goal could be for instance making the production line more efficient or mapping the current situation in order to understand problems and at the end of the project, if the mentality hasn't changed, the risk is that the project just ended is seen as a training or something to do because someone has decided it for others. If it happens, even if the project has brought an incredible result, sooner or later the situation will come back to the starting point. Thus, making a

project is not enough, if the company doesn't go on following this logic. This means that all the employees must engage in daily kaizen activities in order to make the system take root. Often companies end up stopping activities as soon as they achieved results. This approach means that shortly afterwards the situation comes back to the starting point. Bringing change and improvement into other areas is as much important. If not, the ending will be making a project just to do it, without exploiting the real potential of TPS. Companies have the occasion to leave their habits of dealing with problems in a drastic manner, just when the trouble occurs and start devoting themselves constantly to improvement in order to prevent and treat them (Cappelozza 2009). If the efforts are made only in the production plants, this does not mean that overwhelming competitiveness will be achieved. Changing the production system does not mean leaving the commercial area, logistics, and all the indirect and support bodies as they stand. To be re-founded as a company with a strong monozukuri, the whole company must be reinvented in its entirety. From the moment the order is received until the product is shipped to the customer, all the phases completed in the middle go through and involve all areas of the company. As mentioned above, TPS requires a work of streamlining and eliminating of waste, reviewing all processes from scratch. This makes it a concrete and real way to undertake change. Just in this way a company can embrace continuous improvement and get itself ready to transform into a Lean Enterprise.

In the following chapters, the focus of the paper will be on the first point listed on page twenty-nine, namely consultancy. As mentioned above, the experience of the candidate that it intends to report has been gained during an internship in a consulting firm that offers this exact type of services.

## 2.2 Consideri

TPS has been spreading in many manufacturing companies worldwide since the 1990s. As sad before, some are doing it by emulation, perhaps with initial superficiality and suspicion. Others have recently embarked on the path of change, determined to embrace this philosophy of management. Others have already achieved great results. It is increasingly becoming a guiding approach and a set of operational rules that companies will no longer be able to ignore. In Italy, the discovery and adoption of this model has been delayed compared to other countries. However, the corporate fabric of the country, made up of many small businesses, is similar to that of Japan, where these concepts were developed in the 1950s. This affinity also reflects the strengths of the culture of the Italian people, similar to that of Japan, which are: the art of knowing how to do things and the desire to

continue to innovate product and production processes. These values must be sown in the company as sprouts to be developed using the method of lean thinking, to trigger in companies the process of constant improvement. To do this, the model is both a set of tools aimed at identifying the conditions and constraints necessary to achieve efficient production processes, and human resources management. The latter is essential to develop a more receptive mentality in people, more flexible, that enhances the commitment and quality of work, and develops a way to do things and improve them continuously. In Toyota, people are paid to think (Wakamatsu 2016: 15). This means that first it has to get into people's minds, make them understand the principles and make them doing things, without imposing pre-established solutions. Teaching people to think and to change things is the approach of Toyota's bosses and the starting point for consulting companies (Cappelozza 2009).

Considi is a management consulting firm that has been operating for years in the market of manufacturing and service companies in Northern and Central Italy, supporting companies in the processes of change, especially in the field of Operation & Innovation Management. The company was founded in 2004 by a group of consultants but has a longer and more authoritative history. Founded in 1980 by independent partners. In 1988, together with the JMA group in Tokyo (Japanese Management Association), it created Jmac-Considi, the first Italian Japanese joint-venture in the consulting sector. In 1994, with the entry into the Telecom-Finiel Group, it created Consiel, a company that in a few years has become the largest management consulting company Italian-style and owned. This is how, after 20 years of history and consolidated experience in the territory, Considi specializes in what it had started from, that is, in offering services and solutions aimed at increasing the competitiveness of industrial and service companies. In 2009 it started an important collaboration with Culman, a Japanese consulting firm founded by Yoshihito Wakamatsu, one of the world's leading experts on TPS, whose books have been mentioned several times in the first chapter of the paper. Thanks to this collaboration Wakamatsu has recognized to Considi the exclusive right for all EU countries on its teaching and business consulting activities. Recently Considi has been named "Preferred TPS Partner" by Toyota Material Handling Italy (TMHIT). The objective of this partnership is to spread TPS in Italy through the TMHIT Academy. Considi's mission is to create tailor-made models and solutions, adapting them to the specific characteristics of the customers, to their different needs, criticalities and opportunities that distinguish them. It does so by dedicating constant attention to the growth of people and their involvement in the processes of change. As has been explained above, the Considi approach is strongly influenced by the proximity of Toyota following the choices made throughout its history. This cultural closeness has allowed it to learn the true foundations and to settle Toyota's logic within it. For this reason, when dealing with projects at Considi, a great deal of attention is paid to the human component of the client company and in trying to understand the real needs. These characteristics are present in all phases of a project.

## 2.2.1 Lean project structure

In the following lines the main steps of the designing and execution of a generic lean project in Consi are presented.

In the initial study phase Consi and the potential customer company start to know each other. If the interest is mutual an agreement is established between them. A training course is often proposed, aimed first at making the people involved understand the fundamental logics. Depending on the case, the training course may be limited to department heads or may also involve operators. It can even be extended to other company departments not closely related to the project to be carried out. At the beginning of the relationship, a pilot project, which is limited to one area such as a small department or a single production line, is usually started. It can act as a training centre for the company's staff in this way. They will be able to experiment with the logics they have just learned and put their own ingenuity into action to achieve the result required by the management. To do this, it always tries to make clear that, whatever the request, before focusing on the methods to achieve a desired result, it is important to clarify the reasons why the company wants to adopt TPS. In doing so, people become aware that a process of true transformation is beginning and that all the activities that will be done later will only be the starting point of the process. The goal is to make the new logics fully understood so that people become able to subsequently extend the work done in a limited area, up to the whole company. For this reason, the pilot project or kaizen worksite is often only a small piece of the overall path that is being undertaken. But its importance is fundamental. It is activated immediately to put into practice the new principles and to experiment with methodologies. It shows in a short time the potential of the method and in parallel is carried out the core of the project. A common example of a pilot project concerns the 5S methodology in a limited area. This is usually one of the first steps that is taken on the way to lean transformation, as it has an immediate and visible impact, both in production and in offices. It is a methodology aimed at simplifying and making a certain work environment clean and in order. The cleanliness and order that is created through the application of the first 3 S's (Separate, Set in order, Shiny Clean) means that the processes and activities that are carried out in that environment are simplified and the operators involved find themselves working better, without having to look for tools or go somewhere to get others that they often need. The remaining 2 S (Standardise and Sustain) concern the most difficult part of the methodology, that is raising awareness among the resources involved to continue to improve their job-places. Only in this way change remains over time and can progress further. Forgetting the last 2 S's, on the other hand, only leads to a cleaning operation, which gives immediate satisfactory results, but which does not become a way of thinking and acting for people. It means that in a few months, the situation will come back to the starting point because people don't perceive it as

important. Consider therefore tackles and teaches techniques to people, but at the same time gives much prominence to the final 2 S's. In doing so, it is also committed to explain to the management that in order to maintain the results just obtained and to increasingly encourage improvement, it is essential that it guarantees adequate and continuous training to operators, identification of roles and responsibilities in a transparent manner and an effective presence and communication with them. After having understood the customer's needs and characteristics, consultants design the offer. They think about how the project can be done, in how much time, with how many resources involved. They prepare a presentation and a time-plan of the project to show the time horizon of the work. The offer is presented to the customer afterwards, he or she states a consensus or requests some modifications.

In the kick-off of the project, guidelines are presented to all project participants and an exchange of ideas and information takes place. Already at this stage, important ideas emerge regarding further criticalities not considered up to that moment and possible opportunities for improvement too. At the organisational and relational level, a project leader who will coordinate the activities, solve ordinary problems and prepare the progress reports to be submitted to the management is defined. The working groups are also organized, according to the activities to be carried out is immediately clarified when and how it will be necessary to involve everyone. In this same phase, starting indicators are also requested regarding the operational area of the project being activated. It can happen that the required indicators have never been used by the company so they must be created as they will be used to support the whole implementation of the activities. The importance of measuring is explained immediately. Without empirically knowing from which situation the company starts, it is impossible to understand if it is improving or not and how much.

From this moment on, the assessment phase starts. An analysis of the current status is carried out, the existing processes are understood, and the criticalities present in the existing processes and activities are identified. In this phase, it also begins to outline what the future state will be, that is, the future situation to which the company should strive, in the next phase. The analysis phase is usually mostly carried out by the consultants, involving step-by-step those who were needed to obtain the necessary information. During this phase it is shown how the analysis has been carried out and once is completed, the results of the study are presented to the management. The impact with reality is not always easy, so the situation outlined must be explained with absolute clarity and transparency, being careful not to lose the favour of the management. In fact, it can happen that there is a distance between what the management observes and has been living for years as consolidated and what is seen and transmitted by the consultants. In this phase, therefore, it is necessary to have the desire to question those who have carried out an activity in the same way for years or the management that has always considered a certain way of working to be correct and effective. Once a positive opinion has been received on the current situation, the objectives are set. The team expands and involves

internal resources in the foreground, with consultants in support. At the end of this phase it is essential that the objectives established are clear, shared and explicit.

During the project development phase, the actions leading to the reduction of the non-value activities identified in the analysis phase are carried out and the aim is to maximise the speed of the existing processes, reducing their complexity and teaching how to manage space and time more efficiently. Once the implementation phase is completed, the situation continues to be monitored. When the agreed result has been achieved and it has been verified that it is sustainable, the project is considered completed. Generally, a project is carried out according to two possible approaches. These two approaches can also be present within the same project in many cases, as two separate phases of the project. First it starts with one and then it moves on to the other.

1. Consultancy as a constant presence with one or more visits per week. This is the approach that is often adopted at the beginning of the project, when a high frequency of consultants' presence in the company is required in order to get the work moving. Pilot projects for instance, precisely because they are the beginning of a new path for the company, require a constant presence of consultants, active day-by-day in the field with the internal team. In some cases, due to the complexity of the project, this approach is preferred even for a longer period than just the start of the project or the pilot project.
2. Consultancy as a time guide with just a few visits per year, one per month. This approach has been called in this way because this kind of type of presence, that is constant but diluted in time between one day and the next one, usually assumes that the customer company is quite autonomous in carrying out the work. Consequently, the presence of consultants is necessary to monitor the progress and to support the internal team when problems arise. Usually this approach is adopted in the advanced stage of a project, when logics have already been introduced, the work to be done set and the company team is able to continue on its own. In some cases, when, for example, the project is less complex, it is decided to start directly with a lower frequency of meetings.

The decision of the number of days needed to carry out the project depends on several factors such as the complexity of the project, its length in terms of activities to be undertaken, the agreed time period, resources, etc... Based on these factors it is also decided how to set up the presence of the consultants within the established period and the best solution to achieve the objectives set at the beginning of the project is chosen together with the executive board.

This way of structuring a lean project from the point of view of a consulting company has seen to be general and valid not just for the company in question. It corresponds to the most useful way a company could structure a lean project in its organisation. As is presented in the article, the most important project's phases are check, redesign, experiment, roll-in and continuous improvement. The first step means analysing the current situation, understanding problems and how the processes work. The output is fundamental for the redesign moment, where the flow of activities has to be rethought in a way that the non-value-added activities are minimised. The new designed solution has to be put in practice and experimented. In this way is possible to make other adjustments time after time. If the objective is not just achieving success in a pilot project, but experimenting lean thinking all over the company, gradual rolling in of employees to the new way of working is progressed at this stage. In this way the first involved employees are the pioneers in the company and can help other colleagues to adopt the new method proposed as a guide. After that what the company made in a single project, can be extended to the whole organisation. The employees from this moment are working in a new way making continuously small improvements to the way of working, adapting their workplace to satisfy their needs (Jaaron and Backhouse 2011).

## 2.3 Lean project approach

This paragraph has been designed to show the importance of thinking about lean or TPS projects both from the consulting company point of view and from the customer company one. A lean project has its own characteristics and depending on the company where it is willing to be implemented, even the characteristics of the company itself are different. If the project is carried out with the external support of a consulting company, the relational component between these two entities is added. It means that complexity arises, but if the approach used is right and cooperation is fostered, the benefits can be extraordinary. The consulting company has the know-how for ensuring the project success from the technical point of view. What is missing and needs to be assessed carefully is the knowledge of the customer company and the building of an environment where people are convinced and motivated to grow. For this reason, first of all the approach of consulting companies to lean projects will be presented. Hence the focus will be moved to internal variables of the company where the project has to be implemented, at the end of the paragraph.

Even before the actual project begins, when consulting firms approach the client, it is essential to start building a positive relationship. In this phase, a lot of attention is devoted to understanding

exactly the needs of the company. Little by little, a dialogue that offers opportunities for comparison and reciprocal deepening is built. In this way, the foundations for the relationship to be able to last over time are laid. Once the project starts, consultants try to be always close to the company, make their support felt and encourage change. It often happens that the company also asks for advice on other types of services, and if the consulting firm is equipped with them, it offers to carry them out, otherwise, thanks to its network of knowledge, offers reliable contacts. In this way, even after the end of a project, the relationship lasts over time and even if it temporarily interrupts a service, there is still the possibility that the company wants to carry out a new project later. This means that a lot of time is devoted to caring for the relationship with the customer. At an organizational level, they always try to satisfy requests, if a company requires a constant presence, they work to provide it, but if the company fails to maintain the agreement made, they are disposed to switch to a less continuous presence. Consultancy firms in the lean sector work closely with people, so the personal component and the resulting factors are very important. Each project is developed strictly from a technical point of view, so the factors that influence its development are also fundamental and must be taken into account. Experience from lean transformation projects carried out by consulting companies confirms that these factors are crucial. The approach that has repeatedly proved to be the best is even the one that then leads to the most successful results. It concerns a gradual and engaging approach. A gradual approach means that it is systematic and carried out step-by-step so that it allows the necessary cultural changes to take place and that they have time to settle in people's minds. In this way, resistance is reduced and people themselves are more willing to accept new methods and new ways of doing the same activities. This approach must therefore also be engaging because if people contribute directly, with their own ideas for improvement, it is easier to achieve excellent results and they themselves will push the company to implement their own ideas. It is essential for a consulting firm that carries out a project building a business culture that facilitate this logic 'spread together with the customer company. In this way, the company is able to train its people so that they are able to think and make choices to solve problems. The skills thus acquired will enable people to cope with ever-changing situations and will project companies into the future. What is most insisted on in companies is therefore that the man is always placed at the centre of every interest, because it is the man makes a company strong and capable of generating value for the customer (Nordin, Deros, Wahab and Rahman 2012).

When the development phase of the lean project starts, it is possible to find resistance to change by people. A certain level of sensitivity is therefore required in dealing with even the most critical situations. The conclusive goal is the success of the project, but the biggest challenge for the consultants goes beyond that success. Instead, it is a matter of making ambition and tension for improvement an integral part of the corporate culture. They must teach the organization to push all together in the same direction, both from below and from above, encouraging and supporting each



other. Before going on to change the established routines, it is therefore necessary to make sure that everybody has understood the ideas and has become the creators and promoters of change. An explanatory case in this sense is the one of Rhoss s.p.a. It's an Italian company which undertook a process of lean transformation with Considi in 2005. This company operates in the civil and industrial air conditioning sector, a very competitive sector that obliged it to differentiate its product and bring the production of semi-finished products and different types of finished products within it. For this reason, it needed support in different production areas. The great intuition of the management was to spread the culture of value for the customer and continuous improvement in the individual divisions and to improve the productivity of each one, time by time. The individual divisions, once the guidelines of the management had been internalized, acted at different times to implement these changes. After 18 months of activity, the lean principles had penetrated and shaped the corporate culture. This is what made the difference in guaranteeing the success of the project. It was possible because the management chose to work on people rather than on the mere result to be achieved quickly and without hesitation. In this manner the value of the company has increased thanks to the increase in the value of its people, who have pushed their own company forward (Cappelozza 2009). From this example another important aspect that consultants try to pass on to the management, as well as to the genba, emerges. It is that everyone within the company must strive to continue to make adaptations according to the style of their company. Stopping after the first good result means losing many more opportunities. In this way, once the objectives have been clarified, it will only be a matter of researching and refining ever better methods, based on one's own peculiarities. Establishing immediately a positive relationship with the working team is also fundamental because it facilitates the work and generates new opportunities in the future. It often happens that companies start a project in one function, for example in production, and experiment the method with good results. From that moment on, the voice begins to spread among the employees, enthusiasm grows, and the management is satisfied. New projects are thus started in other functions, such as the technical office or the sales department. By doing so, the various functions become all aware of the process underway and gradually autonomous in carrying it forward. These themes will be discussed in the next chapter.

What lean consultants try to do is establishing in the company and in the team, the seed of TPS. It goes beyond just achieving the success of the project. They try to pass on to employees the ability to use their ingenuity, to find and solve problems, making it an integral part of a new way of doing their job. They also try to explain that this is not enough, because employees must also continue kaizen activities day-by-day. Here comes back the concept of mission for Considi, which is aware that if it is successful in transmitting these principles, employees become a single driving force that pushes the company towards improvement and generates a climate and an exemplary organizational culture. Considi does not present solutions implemented in a short time to companies

and by its team of consultants on their own in order to achieve these results. Obviously it is interested in achieving the objective and therefore in customer satisfaction, that is the board of director's opinion, but it prefers a gradual approach, which guides the company's internal resources during change, which makes them understand and implement personally the steps and activities that need to be done. It is convinced that only in this way it will be possible to develop a more receptive mentality, flexible, committed to doing things and improving them in people. Through this necessary step, the company will thus be on the right track to continue on the path of improvement in autonomy. Doing it or not will only be its own choice. It is not so easy because very few companies in the world have managed to reproduce the TPS as it was done in Toyota. Toyota was one of the very few companies to open itself completely and transparently to the world. Some people believe that adopting TPS is only possible thanks to the mental diligence of the Japanese. But this is denied by the fact that many Japanese companies that have faced such a challenge, have not actually managed to achieve the same results as Toyota. Toyota, on the other hand, has succeeded in reproducing this model in foreign factories as well. For instance, one case is the Toyota Material Handling plant in Italy, which was founded in 2010 from the merger between the companies Toyota Forklift Italy and BT CESAB. In 2017 the production plant based in Casalecchio di Reno (BO) invoiced 259 million € with more than 10.000 forklifts produced. In seven years from the acquisition, THMIT has been able to reproduce the winning model of Toyota Motor in a different place from Japan, with non-Japanese people (Ronchetti 2019). If it thinks about Just In Time it is easy to assume that it is impossible to apply for an SME, because it will not have the authority to make the same requests that Toyota makes to its suppliers, like specific procurement policies to implement the system. What needs to be done is a path, which starts from the continuous thinking and striving to change its own system in a TPS perspective, until the new model will be adapted to its environment and its possibilities. Only in this way TPS will take root in the company and in people who make it up. Researching and eliminating waste, simplifying processes, focusing only on value-added activities, are activities to be done not just in production, even in administrative or commercial offices. The phases of conception and design of the product can be also improved with important results in terms of cost reduction and time to market, in the technical office. All these interventions become pervasive and decisive if there is a constant commitment by internal resources. To obtain such a boost it is necessary to manage their change from a routinized job, from their own way of thinking and working, to a new one that only if explained and experimented concretely, is understood, accepted and improved in turn. This one represents the most delicate phase. The consulting firm doesn't have to be alone but accompanied all the time by the management and the property which must become a sponsor for change. All the people who work in it are part of the whole company and can make an important contribution to its change. It is for these reasons that companies like Conside believe that solutions where people contribute with their ideas lead to better results than those

imposed from above and carried out by others. It is a firm belief of TPS that people are at the heart of companies and that seeing their own ideas carry out by themselves is one of the greatest inner drives for people. This creates a new corporate culture that train people to think, to solve problems and to improve. It is by leveraging on man that it is possible to evolve and to cope with many variables that it meets over time. So before, during and after the development of a lean transformation project, there are many variables and factors that occur. These aspects play a fundamental role for the success of the project as they act in establishing a positive relationship between the parties involved and in facilitating the progress of the project. In particular, the interaction between the parties involved is a key aspect for the success of the project. There are many variables and aspects that act together in establishing a good relationship. First of all, the consultant must have a clear picture of what is the corporate structure. It is important to know what's the role of the entrepreneur or of the direction in facilitating or obstructing the consultancy lean project. Last but not least, what's the role of the employees in doing that. Another variable to keep in mind is the economic impact that lean transformation has on the company. Usually companies prefer doing it by themselves, but in some projects, such as the change of a management system, the economic impact is a very important variable, to be carefully evaluated because it can orient the direction towards some choices rather than towards others. It is important to understand which is the most suitable methodology and, above all, the most appropriate way to transmit it and adapt it to the characteristics and needs encountered. Once the intervention has been carried out, attention must be paid to how the work impacts on the processes, how to manage change in processes after this intervention. As mentioned above, it is possible that in the various phases of the project, consultants will encounter resistance or difficulty in making the logic penetrate, so they must always evaluate what happens when there is a remarkable gap between what the interaction needs to flourish and what the organisation actually offers. All these aspects have to be examined in order to understand, measure and develop actions, and adapt the solutions to the context found. Or in some cases, figure out what to do, how to manage the fact that the organisation lacks an important characteristic for the kind of change they would like to undertake.

In an article published by the College of Business of the University of Malaysia, a study has been conducted on developing the framework for organisational change management during lean principles introduction into companies. What the author discovered was that are many barriers to lean manufacturing implementation in companies. According to the opinions of many other researchers, the most common barriers have been highlighted. Misunderstanding the concept and purpose of lean has been considered the main one. The reason for it is due to cultural differences between people who try to push lean concepts and who make resistance to its entrance. If this transition is difficult, is even probable that other issues such as fragmentary adoption of lean tools and incorrect use of them will occur. Other important issues that have been found in this study are

lack of resource availability in terms of time and expertise, lack of clear communication and lack of top management support for change. These last two elements are particularly relevant. If concepts are not explained clearly and people are not aware of what they are doing in the future and why they are changing the way they work, fostering change is quite complicated. If people on the top don't support the others, the result is inevitably the lack of interest and commitment in lean. In this way is difficult to build a solid company culture that believes in those themes (Nordin, Deros, Wahab and Rahman 2012). At the end of the paper, the author proposed even an analysis of what should be the changes to be taken by an organisation that is aiming to start a lean transformation path. This analysis has been carried out by another group of researchers who have divided these changes into four different categories. They are change in process, so that a new set of lean tools and multi-skilled workers that are able to build and use them are necessary. Change in function, control and coordination, as working in teams is fundamental, the traditional system has to be changed in order to leave people the possibility to move freely among functions and departments and cooperate. Changes in values and human behaviour are a fundamental category as opening communication and information sharing among people is a condition that doesn't leave any other possibility. People have to stay in contact in order to be able to cooperate. Knowledge has to be shareable and accessible to everyone needs it. All these aspects enable a continuous improvement culture to be developed. Changes in power is the last category and means attenuating the top-down way of managing people and imposing tasks. People become more autonomous and responsibilities are decentralised (Cao, Clarke and Lehaney 2000). Once lean manufacturing has been explained like involving many different aspects of an organisation, the author presented the factors that have been highlighted by several researchers as critical for successful lean manufacturing implementation into a company. According to this analysis, the most important factor is effective leadership and management commitment in fostering change. This happens because management is responsible for creating a strategy, thinking to the implementation plan and showing a positive example of how the project should be conducted to the employees. If management is committed to reach the success, all the resources will be provided and the vision and strategy for change will permeate developing highly-motivated employees (Yadav, Nepal, Goel, Jain and Mohanty 2010). Communication and team development are other two key-factors for successful implementation of this new system. At the same time, people have to be trained and educated to continuous improvement (Worley and Doolen 2006). They have to think in a different manner, become change agents and build a new culture. Acting in this way, people grow and are evaluated for their contribution in fostering improvement. The result of a successful implementation is that lean change can spread all over the company (Berta, Cranley, Dearing, Dogherty, Squires and Estabrooks 2015). For this reason, during the analysis carried out in the next chapter these aspects will be taken into account.

In another article published by the African Journal of Business Management, a similar model is developed, a “roadmap” that delivers an approach for implementing successfully lean manufacturing in companies. The stages of the project are the same highlighted in the previous paragraph about a lean project’ structure carried out by a consulting company. A relevant importance is given to the phase of the pilot project as the required step to pass on expanding to whole system. The other relevant aspects are the accuracy of the analysis and training. A bit less relevant are aspects such as need for change and the organizational structure (Anvari, Zulkifli, Yusuff, Hojjati and Ismail 2011).

Another article that aims to deliver a useful framework for successful lean manufacturing implementation has been selected because it gives relevance in particular to SMEs. Here the authors said that implementing lean manufacturing in a company can be considered as any other change introduced to it. It is identified as the behavioural shift of an organisation from one being to another. It is the process of continually renewing an organisation’s direction, structure, and capabilities to serve the variable needs of external and internal customers. This paper then focused on the principal causes for failing this implementation. They have been identified as related mostly to leadership, involvement of the employees, business systems and conflicts with other agents like suppliers. After that they have been compared to the factors that act as drivers of change and been put into relation. From the management point of view, if people are committed, what before was a barrier becomes instead a facilitator. People are involved in the project, are able to work together and share a new culture. Production and supply chain are more and more integrated, and everyone is aware about the importance of identifying waste and searching for improvements opportunities. As the first step is identifying value for the customer, people think to production in a different manner. Everyone is committed to better respond to demand. Identifying value means understanding its own reality and how adding value to its proposal. If the analysis said that a specific function in production has to be optimized, every effort has to be canalized in improving that function. The approach is gradual and change culture is fundamental. From the financial point of view, benefits are necessary, thus in a small reality is important achieving fast and concrete results to gain confidence and support (AlManei, Salonitis and Xu 2017). The main difficulties found in implementing those principles in SMEs have been extrapolated from an interview to 10 small Italian firms. Many of them didn’t know lean methods, so trying to do it by themselves is become a strong barrier to implement the new system. Many others suffered for the absence of knowledge and managerial education. If business owners don’t know neither the meaning of what people are implementing, the lack of education is disturbing. For this kind of companies, hiring qualified staff is hard, because it needs higher wages and a small company could not be as attractive as a big one. A path of training could help all of them to grow, without considering hierarchies. The support of an external figure could have probably solved most these problems (Matt and Rauch 2013).

In an article published by Production & Manufacturing Research, another aspect is added. It consists of monitoring and controlling the advancements of the work. It is fundamental because without tracking and regulating the lean implementation progress, the risk is losing focus on the activities and reference point on performance. One the rules of lean thinking is measuring and assessing properly what it is trying to improve. If not is impossible to say if the system is performing better or not, and how much. Doing it is the first step for sustaining change in the future. Thus, establishing monitoring mechanisms ensures lean projects sustainability and avoid the possibility to easily return to the previous methods (Mostafa, Dumrak and Soltan 2013).

In the following chapters, the aspects presented will be analysed to determine which are the most relevant factors that have a positive or a negative impact, in consulting lean projects.

### **3 Key factors presentation**

The aim of the dissertation is isolating and grouping into a few specific categories all the possible variables and factors that are relevant before, during and after the development of lean projects carried out by consulting companies. This chapter is perhaps dedicated on determining factors that influence the outcome of a lean project conducted with a consulting company.

Toyota Production System has been explained so far as a management philosophy. It consists of the main framework of the paper, as every lean project and even the smallest one regards such a way the same logics explained before. Once the theoretical framework is provided in chapter one, the context of operativity of the projects has been explained in chapter two. The focus has been then put to the approach how consulting companies operate and how lean principles introduction occurs in companies. From these aspects, many useful characteristics have been found for guiding the further analysis. Thus, the focal points on which consulting firms focus more during the design and development of a lean project are explained along this part. From here, the different factors that enable lean projects success and their relative categories have been identified.

In the next paragraph, the methodology used to select the factors and the cases to be taken into consideration for the analysis phase is presented. The last paragraph lists and explains the factors and the relative macro-categories chosen.

#### **3.1 Research methodology**

In the previous chapter, a deep understanding of what implementing lean principles in a company means has been provided. The focus has been put on the way lean logics are introduced into companies and what are the factors that are able to guarantee the success of the project. These points of attention are valid even for a consulting company aiming to conduct a lean project in a customer company. Perhaps the cornerstones on which the consulting firm approaches the project can be summarized into two components: one is relational and the other is technical. The first aspect begins with establishing a positive relationship with the customer. The other concerns the complexity of the project, the dimensions, the areas and the people involved, the timing necessary, the methodologies used, and it depends both on the company's characteristics and on the consultants' ones. Starting from these general aspects, this chapter proceeds going into more detail in order to

highlight the individual determinant factors. The choice of factors has been guided by the study of the same principles of the Toyota Production System and Lean Production explained in chapter one. It has been decided to put together the literature presented along the dissertation and the different sources presented in chapter two as foundations of the practical approach to lean introduction into companies. These two reference points have been put into relation in order to develop and analyse a pattern of factors that contains all the elements that lead to the success of a lean project. Those factors have been deduced from different bibliographic sources. A main reference has taken by the book "The ten teachings of Taiichi Ōno" where the thought of the creator of the TPS are explained by one of his disciples, Wakamatsu. Another is "Hitozukuri and Monozukuri", a book by the same author that focuses on the strict relationship between the art of manufacturing efficiently and the art of making people grow. Lastly, with regard to the operating context of consulting firms and the way how lean principles are introduced into a company, reference was made to the themes highlighted by the articles cited along the chapter. The outcomes have been critically analysed in order to motivate the choice of each factor. After that, four macro-categories which contain all the key factors highlighted have therefore been deciphered in order to facilitate their classification.

In chapter number four, instead, findings are presented. Once the most relevant factors in determining a successful lean transformation project have been determined, three real cases have been selected in order to examine what are the effects of those factors. In order to carry out an analysis that is not limited to a single business reality, but representative of companies with different characteristics, the model of presentation of multiple case studies analysis based on the method proposed in the article "Case Study Research. Design and Methods" has been used (Yin 2017). Thus, real cases of lean projects carried out in companies have been examined in order to look for the presence and the relative effects of all the factors. These cases regard three different companies where the same consulting company has conducted several projects during last two years. The companies are all located in the territory of the Marche region, even if in different provinces. All the projects of the selected period are related to operations and production areas. The companies analysed are comparable in terms of area of activity, that is mechanical engineering industry. Two of them are large enterprises and are quite similar for dimensions and number of people employed. The last one is a SME and has been included into the sample because the relevant factors have been discovered to be recurrent even in such a different reality. This similarity allows to take into account different cases and realities, where, however, the same factors insist. In the following paragraph, according to the presence or absence of the factors, the cases have been compared and put in relation in order to show their effect on projects' success. Thanks to the results achieved, the last paragraph in chapter number four focuses on showing how these factors manifest themselves during real projects and what they determine. In agreement with the companies mentioned, it was decided to include a brief presentation of the companies in question and real information from



projects carried out, such as type, timing, people involved, results achieved, that are useful to better understand the weight of each of the factors mentioned.

### 3.2 Key-factors and respective macro-categories selection

Consulting companies operating in the lean sector work closely with people, so the personal component and the resulting factors are very important. Each project is also developed rigorously from a technical point of view. Based on the requirements of the client company and the observation by the consultants, a technical proposal is formulated for the development of the project using different tools. Therefore, the methodological factors that influence the development of the project are equally fundamental and must be taken into account (Karim and Arif-Uz-Zaman 2013). Bearing in mind these two fundamental characteristics and having clarified the methodology how factors in question were researched and selected, this paragraph presents the various factors identified during the analysis. As explained in the research methodology paragraph, the various factors have been derived from specific points expressed by different studies carried out on these themes. Each factor has the source indication it is derived from. They are:

1. **"Convictions"**.

Being able to understand people's behaviours, to guide their reactions in dealing with the project together, are fundamental aspects when it is bringing change to the company. Being able to break down the traditional way of working and thinking of people is not an easy task. If in addition it demands to transfer the new logic of TPS, which can often be counter-intuitive, the mission becomes more complicated. In this sense, it is first necessary to clash against people's convictions (Nordin, Deros, Wahab and Rahman 2012). This factor is related to the issues, areas of intervention and opportunities for improvement in the future state. The perplexities can be summarized in: "What are the consequences of a lack of openness of people to change? How much the relationship between them and consultants could be obstructed by those convictions and how to avoid creating a wall between consultants' job and the property's vision?". This is the reason why it was decided to start from the factor "convictions". It is not possible to find a single way valid in all cases in order to answer these questions. The consultant has to keep in mind that people they relate to live their reality on an everyday basis. This reality is personal and can certainly be altered by their perceptions. It must therefore move carefully, going to break down step by step the wall of convictions of

people. People's beliefs can be a block to the progress of the improvement project. Some will argue that the traditional method is the best because it has always been done in this way and will not be open to discussion. At the same time, "positive" beliefs push activities forward. Without tenacity and results, the beliefs of others will not be broken (Wakamatsu 2013).

## 2. **"Resistance to change"**.

As they express their convictions, some people also show resistance to change (Cao et al. 2000). This can be even more difficult to annihilate. The factors that generate it can be several. People are usually afraid of change. They see it as a potentially negative change of state from which to stay away. Another reason may be that they are accustomed to their condition and changing would mean that they no longer have the same privileges. Even if they feel the need for change, the fear of the unknown, acts as a repellent and keeps people away. They end inevitably up countering the bringer of change in the company and become real obstacles to the growth and success of the project. When someone is bringing change in the way people carry out a certain activity, it can happen that other people oppose and obstruct change to take place. In these cases, there is the fear of leaving the routine they are used to or losing any benefits, and the refusal to enter into something they do not know (Wakamatsu 2011).

## 3. **"Involvement"**.

Involving professionals means not imposing on them solutions that have already been thought out and decided but leaving room and encouraging everyone to share their ideas. In this way people perceive as their own and important the improvement activities they are carrying out and this makes the project proceed with rapidity. Transferring people's tension for improvement means that they can finally open up to progress and begin to look at the reality around them with a different vision. Involving people, making them feel part and responsible for the reality that they are changing for themselves and for better, has an extraordinary power. Human beings tend by nature to reject a situation that does not understand, imposed by others, and to oppose to it. If people who work in a workstation are involved and listened to and put in a position to change their own workstation, then the result that will be obtained will be far greater than any other reached in a different way. People will become more and more autonomous in managing their work, they will be able to continue to improve it from time to time and transfer their new way of thinking to others. If on the contrary, the company considers a step done, just implementing the tool or the method was prefixed,

without giving to the new condition achieved the necessary support to be maintainable, the solution will not last. Training people every day allows the company to have highly-motivated employees and activities that are carried out with resolution (Yadav et al. 2010). This principle has even obtained from the fifth teaching of Taiichi Ōno. It says that that people need to understand how important it is to exploit everyone's ingenuity. The kaizen approach is step-by-step, so people need to be free to think. Even if it takes a little more time, involving and training people, it builds a stronger environment where human ingenuity is able to solve any problem. For Ōno, the strength of people's minds and therefore their involvement in the growth of the company are fundamental elements. Only in this way the company can develop a true competitive capacity (Wakamatsu 2016).

#### 4. "Sponsorship".

The role of people at the top is fundamental because if they don't give it the right sustainment, people on the bottom will not follow any more indications. All the efforts that have been done before will be perceived as totally un-useful and any other future attempt will be labelled as a waste of time. On the contrary, continuing investing time and resources on this path as soon as some activities are concluded, is fundamental to reach furthest goals. The support of the company is essential for doing it. Everyone must be convinced of the path to be undertaken. If someone, especially from the top, is hesitant, people from the bottom will no longer be motivated to change. If everyone does not perceive that change is a fundamental prerogative for the property, they will ask themselves "why should I have to change, if they are not willing to change on the top?". This means that people do not go on independently in the continuous path of improvement. If the company manages to do new things means that there is first of all the willingness of the entrepreneur to change and grow. Commitment is fundamental because there are many initial obstacles. The motivation of the property also comes from the economic impact of the investment to complete the project. Motivation means effort and commitment in adapting working methods to the organizational climate and needs of the company. It often happens that company managers do not show an interest in the organizational climate, without understanding its close link with the growth of employees and the functioning of the system. The management must instead understand immediately that its presence and determination to push change are the basis for building the future. This means being ready to intervene when enthusiasm falls, giving time and confidence to their employees so that they can learn and experience better and better solutions. The point of view should switch from leadership to sponsorship because being a trustworthy guide is fundamental. If the departmental chiefs are attentive and helpful, they can convey their

commitment to the employees, who will perceive that the job has become less heavy thanks to the kaizen they have undertaken together. If this climate is created, the genba will take the initiative in the future. Ōno thought that the chief that respects these conditions, will hear employees asking his help from everywhere in the genba, and will take several hours to cross 100 meters. The job of chiefs is not something to be undertaken with power and authority. Everything depends on how they form their people. The presence in the company of high-level figures who promote and show attention to the project and who give support to the employees, ensures that the importance of the same is perceived by all. People are no longer leaders, but promoters of a project. This principle has been derived from the sixth teaching of Taiichi Ōno. It says that it's important for a leader to become a trustworthy guide. Without forcing people to kneel, they get much more from people (Wakamatsu 2013). The figure of the entrepreneur, the vision, the function of guide for those who work in the company are a powerful instrument to make everyone understand that the company cares or not about the project in question. That person has to be the first sponsor of a project if it expects a successful ending.

##### 5. **"State of necessity".**

There is a huge difference between making projects only when problems force the company to change or making them to improve, despite if everything is going well. The drive to change will be greater when the company is in crisis, everyone perceives the discomfort and wants it to change. The less the internal drive is, when there is just willingness to improve more and more, to change when everything goes well does not have the push of a critical situation where something has absolutely been done (Anvari et al. 2011). Thus, if a company is able to give vision of a better future, people will be more motivated to embrace change. On the one hand, a high state of necessity is positive for the commitment and degree of involvement of everyone. In this case the situation is felt by everyone and a failure cannot be contemplated because there is an extreme need for a solution to a problem. In this way the project will proceed quickly. The important thing is not to let fear prevail, which from a push factor could become a blockage one, without knowing what to do. However, a failure or a downsized result will not be considered as acceptable. On the other hand, a low degree of necessity poses the risk that the project is not perceived as important precisely because there is no emergency. It's difficult to give the perception of a better future if everything is going well. This aspect could slow down the pace of progress a lot or even block the project. The attention to the final result will be equally high and unless there is exceptional proof, it will be possible neither in this case to strongly turn the attention on the project. The condition of

need of the company thus implies a degree of attention to the project. If the problem is perceived by all and people know they can't no longer go ahead in the current way, the motivation to change or the fear, if they are in trouble, push the project forwards. On the contrary, if the need is not perceived, the attention and commitment to the project will drop. According to Taiichi Ōno instead, the right approach would be to create a continuous propensity for improvement. "A solution can also be planned for tomorrow, but a good solution can only be prepared today" (Wakamatsu 2011: 87).

#### 6. "Lean team".

The presence in the company of people dedicated to carrying out exclusively improvement activities facilitates the progress of the project with the consulting firm. It means that there are already those who can take care of the project internally. They are able to continue the job after the day spent with the consultant. That's the only way to make a transformation possible and continuous improvement sustainable. There are other benefits of having an already established lean team inside the company. For instance, the level of TPS training is already underway and they have to work much less to get the logic to penetrate in depth. These people are closer to the consultants but being internal they constitute a more direct and immediate point of entry and then expansion throughout the company. Consequently, carrying out collaborative projects in an environment that not only has internal resources dedicated to improvement, but can also be defined as a lean organisation, means entering into an environment where people are at the forefront, where everyone proceeds daily to fight waste and to solve problems within their own area. However, literature says that a company embracing TPS does not need dedicated figures to continuous improvement, because everybody should take on these activities in their daily work (Cappelozza 2009). From the practical point of view, this presence however ensures that planned activities are more probable to be carried out. A well-organised company, where everyone has specific tasks and responsibilities, is a place to work better. If everything is well organized and there are people in charge of defined activities, this is an advantage also in the case of lean projects with consulting companies. It means that there is a clear and shared team to work with, suitable places to conduct activities, days acceptable for both parties to meet in the company. The figure of the project leader is fundamental from an organizational point of view, because is the one who sets the appointments, who gathers people and who forces the progress of the work and commitment when the consulting firm is not there. The work goes on more easily, and a positive working environment that makes people suitable to be involved and participate in the activities is created. When these conditions are not fulfilled, the opposite

effect occurs, and work progresses less smoothly. In this sense for an external force trying to enter, organisational difficulties represent a debilitating factor not to be underestimated. If the daily work is continuously interrupted due to lack of organization or availability of people, it inevitably generates a situation that disturbs the progress of the work. As a result, consultants find harder to hold the reins of the project and keep people focused on the final goal (Jaaron and Backhouse 2011).

#### 7. **"Business culture vs. Lean projects".**

If the corporate culture is based on making people grow, on putting in first place the continuous research of wastes and opportunities for improvement, the progress of a lean project is facilitated. In the same way is more probable that the company will be able to carry it out on its own in the future. Perseverance is a fundamental element. According to Ōno, it is necessary to strive to the point of really understanding. People do not have to stop at the surface but always push themselves beyond the limits that are often set by others. Only in this way unthinkable goals can be achieved (Wakamatsu 2016). The management has to understand what its priorities and objectives are. If it is motivated to continue and believes in the project, then it must avoid interruptions and lead the company into the new state. If, on the other hand, they are not motivated to change and are reluctant to overturn the traditional routines, the lean project will never come to fruition. Consultants must therefore clearly explain what they expect from the management and what they need to do. In doing so, they begin to change together, and the company becomes aware of where it can get if it continues along the same path. The company is therefore changing in its culture as well as internally, in the way it is organised or in the way it carries out certain activities and manages people. In other words, it is evolving into a company that seeks and encourages continuous improvement. Doing this is a long way that requires the willpower and determination of all, especially management. If the consultant is successful in passing on this impulse, the environment is proactive, where all changes are facilitated and where the company is increasingly able to complete its path on its own. Doing so means listening to the ideas and proposals of all, everyone is responsible for his or her own work and is in charge of doing it, always thinking about how to improve it. This corporate culture is the engine that drives people from within to commit themselves and look for more convenient solutions using the mind. Obviously, for a consultant, carrying out lean projects in a company like this one is more pleasing because people are more collaborative and closer to understanding the message that the consultant wants to convey. As a result, projects are greatly facilitated and are likely to lead to success. When this important factor does not exist, the opposite effect is

achieved. If the company has never encouraged improvement activities, so people have no incentive to follow what the consultant says and carry it on, simply because they don't understand it. The consultant will have to do more work to build the TPS logic in people's minds and spread it throughout the company. The success of the project will be more difficult to reach because it is necessary to undertake a path. If the company does not understand it or just wants to obtain an immediate and secure result, the real change does not take place and once the project is finished, the logic has not taken root and the environment remains as before the intervention. This factor is one of the most important because, if present, it involves the whole company. Having a corporate culture aimed at improvement means that it is such for all the people who make it up, from the entrepreneur to the worker. Everyone deals with improvement in the same way and drives the company towards the future (Berta et al. 2015).

8. **"Competences"**.

The level of competences of the company's resources is an important aspect that influence the design and the advancement of the work. At first glance, the theme of internal skills may seem fundamental in determining the performance of any activity. If people do not have the necessary skills, it is certainly impossible to carry out a certain activity that requires it. In manufacturing companies, the know-how, the skills of employees have become increasingly fundamental and a strategic lever on which to play their competitiveness. However, they can be taught. If the company understands the importance of spreading knowledge among its people and departments, the possible lack of skills is no longer a problem. Similarly, when it starts a lean project, it also starts a training course aimed at building the skills that are not yet present in the team. If the company believes in training and knowledge sharing, people are put in a condition to grow, they can learn to use new methods and new techniques. In this way, the presence or not of certain skills at the time of the entry of the consultant, is a key factor less crucial than those mentioned above. Obviously, however, if the skills are absent and the company does not encourage their training, the project will struggle to move forward (Nordin et al. 2012). Once the logic has been penetrated, the tools and methodologies can always be taught.

9. **"Pre-start expectations vs. proposal"**.

This factor is a relevant aspect in terms of the project decision. It is from this elaboration that the area of action of the project will be established. It has importance even from the relational point of view, as finding an agreement, a common language to understand each other is fundamental. Before the start of the project, the customer company could have its own idea.

It could consider a certain area as the most critical and think that the problems fall into certain roles, functions, activities. This idea could have been misled by time and by the habit of living the same reality. The debate with the external opinion of consultants at the beginning of a relationship can be an opportunity to look at reality in a different way or it can be extremely costly and block the project at once if the differences are not filled. As the project is at the beginning and in some cases even the relationship with the new customer is being created. It is therefore important to make a good impression at such a time and understand what the company is looking for. Not doing so would mean losing the project and the customer. Sometimes it could happen that what is requested does not correspond to a critical area from which it would be more appropriate to start working. The consultant instead may find other more critical areas after a careful observation. In such a situation, the consultant should not think only about satisfying the applicant, because activating a project in an area where there is actually no room for improvement can be inconvenient for both parties and break the relationship prematurely. It must therefore strive to find a meeting point between the two points of view and centre the desire of the property at the same time. If the property is not satisfied with the project they have started, only an extraordinary result could change their idea. Throughout the duration of the project, however, there is a risk of not benefiting from their favour and arriving at a satisfactory result in the end becomes more complicated. Therefore, in order to facilitate future work and to make interests coincide with the real needs of the company, the choice of the project to be carried out is already a key point. Obviously, it is still the beginning so there is time to clear away any doubts and perplexities, but the choice cannot be done with superficiality. On the other hand, support and cooperation are elements that make the difference and enable work prosecution easier (Wakamatsu 2011).

#### 10. **"Project characteristics".**

The technical characteristics of the project concern the specifications, the techniques used, the necessary timing, the people involved on it. The technical difficulty of the project depends on this factor because it is different to carry out a very large and complex project, compared to a smaller and simpler one. All this information is in the possession of consultants and is based on their knowledge and experience. A good consultant will certainly be able to find and design the best way to execute a certain project. As has already been pointed out, the purpose of this dissertation is not to guide a consultant in the choice of one methodology rather than another. Once a person is prepared from a technical point of view, knows the techniques and how to teach them, what makes the difference are people and the way in



which they are brought on board. This factor cannot be not considered but other factors are more crucial than this one to deliver a final success (Cappellozza 2009).

All the ten factors explained above are referable to personal and technical components characterizing a lean project. These two main aspects can be then deconstructed into four more specific macro-categories. These selected categories include all factors highlighted during the analysis.

1. **“Relational and personal” category.**

It includes all aspects and factors that have an impact on the relations between consultants, and the customer company. The positive nature of the relationship between the two bodies is fundamental for the project to progress continuously and ultimately lead to success. The human and personal component is clearly called in place as the main element of determining the relationship. It also has a decisive effect on issues outside the relationship with consultants. Everything concerning the internal resources of the company and their behaviour in the moment of interaction with the new method, has been included in this group.

2. **“Organisational and structural” category.**

This group concerns the customer company as an organisation of people and departments in relation to each other. The factors that belong to it therefore concern the more structural characteristics of the company and its management. It concerns concrete characteristics, such as the presence or not of certain functions and figures in the company. In this category, in fact, much space is dedicated to the figure of the entrepreneur or management in general and to the role and drive that they determine or can determine. The company culture and its effects in spreading or not the spirit and the tension to the improvement among the people. The situation of the company in general, the historical moment it is going through are also included in this category.

3. **“Technical” category.**

As the title indicates, it concerns the technical characteristics and internal skills possessed by the company. When a project starts, it is important to understand the level of competence already possessed by internal resources in order to understand and model the approach according to the peculiarities found. In this way, where the skills required to carry out a certain

type of work are not yet present, people can be trained. Given that more training paths can be activated over time and people can be put in a position to express themselves at their best, the lack of skills is not seen as one of the most decisive characteristics for the development of a lean project. Obviously, it slows down or changes the progress, but if there are other variables of a behavioural nature, certainly the time invested before creating new skills will be returned later with excellent results.

4. **“Project” category.**

This last category concerns the factors that characterize the specifics of the lean project. They include all the technical characteristics related to the type, duration, size, methods used during each individual project. However, these characteristics are extremely specific to the individual project and evaluating them is part of the standard work of the consultant. For this reason, in this analysis, which aims to provide a general guide to the key factors of success that are valid for all projects, regardless of their nature, not all the factors that make up this category can be explained. What is considered is instead the impact that can have, before reaching an agreement between the two bodies, the comparison between the expectations of the property regarding the critical issues to be addressed and those actually detected and shared by the consultants. This "clash" between everyday life and reality can sometimes interrupt a project even before it begins or can immediately disturb the property. Other times an agreement from the beginning can be reached and it facilitates and gives complete trust to the consultants.

Figure 5. Key factors table

<b>Relational and personal</b>				
	Convictions	Resistance to change	Involvement	
<b>Organisational and structural</b>				
	Business culture vs Lean projects	Sponsorship	State of necessity	Lean team
<b>Technical</b>				
	Competences			
<b>Project</b>				
	Pre-start expectations vs Proposal	Project characteristics		

*Personal elaboration*

The table above shows the ten key factors grouped for their relative macro category. The number of factors highlighted for each macro-category is already an indication of which categories are the most important. This element, together with the importance posed on people and on the way they interact with each other within the organization, means that the most critical factors are those with human and relational component. In the first group of factors listed, in fact, people are highlighted as beings endowed with ingenuity, with their own thoughts, who can decide to help each other and to guide others towards a cause they consider right, or on the contrary to hinder the progress of a project, to remain tied to their habits, are the main protagonists. The other most important group of factors is

the second one, where the company stands out as an organization of people, as the result of its entrepreneur's willingness and charisma to instil in the employees the tension for improvement, in building together a corporate culture of excellence. The last two groups of factors should by no means be underestimated, but the analysis has detected their characteristics to have less impact on the success of the project than those mentioned above. The lean project is conducted on people, they are the agents of change in the company rather than the way a project is executed. If the approach is focused only on the technical components or the skills of people, it leaves aside the transfer of thought for improvement. Acting in this way, once the project is finished, the company will be hardly able to continue on this path by itself. Even if a good result is achieved in the short term, when enthusiasm falls, the old convictions of people can return and it inevitably returns to the starting point, rather than continuing to grow and improve. These issues will be taken up in chapter four.

## 4 Findings

This chapter presents the results of the analysis made on real projects carried out by the consultancy firm. During the presentation of three selected cases, the focus is put on the ten factors highlighted in the previous chapter. As explained in the research methodology's paragraph each case has been conducted in a different company. This means that consultants faced with a different environment, a different organisation, different people involved, and methodologies used. The field of action was common to all of them and is production area. The typologies of the projects requested and carried out were improvement of the existing processes and regard not just a single action but a wide range of activities. Each case is intended as a path and embodied more single projects. Two cases of three regard specifically a production line where recovering efficiency. The third case regards the progressive transformation of the whole company. Every case contains those factors and shows how they act according to different conditions. They can become a factor of success or failure, according to their presence or absence during a project. In the first paragraph, the three enterprises are briefly presented. In the second one, the cases are described with particular focus on the development of the lean project. In the third paragraph, every aspect has been deepened and the results achieved through the analysis of the cases is discussed. This is the development part, where all the cases have been compared in order to understand the impact of each factor.

The aim of the dissertation is to develop a guide for consultants, including all the factors that may affect the progress of the project, for better or worse. For this reason, at the end of the chapter a final pattern which explain how is generally possible to meet them during a project is developed. Dealing with them is fundamental to achieve a successful result, thus the pattern is divided into the four macro-steps where a consulting project is structured. For each phase the factors that are determinant or that can be found and necessarily dealt with are shown there. Having a useful way to approach a lean project is fundamental both for the consultant and the customer company. Once the factors have been found out, they have to be set and explained in order to make easier understanding the framework and the context of a project. Even in this type of activity having a clear picture of the situation then helps to decide on future actions and the best way to proceed.

## 4.1 Companies presentation

### **Rivacold**

Rivacold S.r.l. is a company founded in 1966. It is a supplier of condensing units and hermetic systems and manufacturer of refrigerated counters and cabinets. As a result, through the years it has reached an important position as a manufacturer and distributor of components to the refrigeration and air conditioning industry. The company is based in Montecchio, in the north of Marche district. It is possible to find all its plants for the Italian production there. Each of them is specialized in the production of some condensing components or finished products. It has opened other subsidiaries over the world: Rivacold UK, Rivacold France, Rivacold Slovakia, Rivacold India. It's a patriarchal company. Today is living an expansion phase, with a growing market and the need to keep up with the increase in orders and the development of new products. For these reasons, the property is feeling the need for recovery and set the organisation properly. This desire to improve, it is still not penetrated at the bottom. This company has more than 1000 employees, with a turnover of more than 120 million euros.

### **Company Alpha**

This company cannot be nominated for reasons of confidentiality. It is a company with a quite long history, which began in the 50's. It operates in the sector of the construction of professional coffee machines. They have been one of the reference points of the Italian quality mark for these products. The company's turnover is around 100 million euros and employs about 400 people. The company's market is mainly abroad. The company is in a positive condition. In recent years it has invested a lot of resources to grow in terms of the product development. Ownership is satisfied and the company has never been more flourishing. Recently, it has taken a path of improvement in its production area, showing interest in not only taking care of its product, but also about the way in which the whole system is organized to manufacture it.

## **Paradisi**

Paradisi is a traditional SME, founded by the entrepreneur in 1957. It is located in Jesi, in Marche. Its main activity is based on the production of mechanical components like handles, knobs, quick couplings. It started as a manufacturer of turned components for agricultural machinery. After a few years, it extended the production to the automotive and electrical appliance industry. All the processes are carried out by means of lathes, which makes it a turnery. However, visiting the plant, it is immediately clear that it is a special turnery. The company's turnover is around 9 million euros and employs about 35 people. Differently from the other cases included in this chapter, the following is not the result of a project carried out by the candidate but of an interview with the owner of the company and the consultants who followed the projects there. For this reason, the introduction of this case is even more interesting because it offers the possibility to observe the evolution of a lean transformation path that started about ten years ago. This characteristic will be taken into account again, during the explanation and discussion of the case. Another aspect that make this case different is the dimensions of this company respect to other two presented above. This aspect will not be relevant in terms of the included factors. In the next paragraphs everything will be clarified.

### **4.2 Lean projects presentation**

#### **The case Rivacold**

Rivacold has been founded by the entrepreneur in the '50s and carried on with his strong imprint until today. The company has grown quickly in recent years. This factor has meant that sooner or later it was necessary to structure itself properly. Today, the family is thinking about the future and the generational change. They feel the need to structure the company properly in order to move forward into the future. This situation led them to start a lean path with Considi in 2018. The first intervention was about support during the implementation of a new management software. After gaining confidence from the performance of the latter, they asked to have support in projects of different types. The company was interested in improving its overall performance and they discovered the many possible areas of intervention with them. The drive to make more and more projects has grown continuously. The strong and continuous effort, the great presence and willingness to be continuously updated by the family, do not go unnoticed by consultants, but

especially by those who work in the company. Seeing a property so involved and that cares a lot about the success of these projects and growth, is an additional stimulus for employees. They know that they have the support of the company and also that it is necessary to carry out these activities successfully. As a result, about ten improvement projects were gradually launched. These projects concerned the production-logistics area, the technical area, and the commercial area. As far as the projects in production are concerned, they were started in three different plants of the company, where products, people, processes and activities were different from each other. For this reason, the case will be presented as a set of projects that involved the different production areas of the company, because even if they were carried out in different places, the same factors have been valid for them. The first project took place in one of the company's historical plants, which produces condensing units both for other company's divisions both for the external market. This project was presented and perceived by people involved as a revolutionary project. It consisted in experimenting with TPS logic in one of the 23 production lines of the plant. For the first time in its history, traditional logics have been changed, and specific work will be done to recover production efficiency in that line. This made it a pilot project, as its success will determine the possibility of extending the same model to all the other production lines, including those of other plants. The intervention foresaw the conversion of two production lines into one, and the use of the same number of operators, but moving two of them to carry out operations outside the line in question. Four of the remaining five operators, worked on the line and one of them act as a "joker", that is an operator without a fixed workstation and without activities initially assigned, who intervened promptly if problems occurred in any necessary workstation. The most complicated part of the project was to convince the operators of the line in question. They were experienced and specialized operators who produce more complicated and artisanal machines than the other production lines of the plant. Given the particularity of the product, they felt justified for their low performance by the fact that incorrectness occurs in the bill of materials, and by any problems that also fall on the supply side. They have historically been accustomed to a little control by the department heads and to manage their own time autonomously. They therefore got used to their own rhythm and to carry out more machines at the same time instead of one. The concept of advancement of the machines according to a specific cadence was a completely new aspect to be introduced. After the study carried out on the products and on the balancing of the line, the new production line was created with four fixed workstations and four buffer stations after each of them. In order to simplify the work of the operators and to avoid useless waste of time searching for materials, all the components were picked up and brought in line in the form of a kit, in a box for each machine to be produced, and placed near of it. At that point, the possibility of an efficiency recovery of 36% was highlighted and it became the objective of the project. To achieve such a great result, the team composed by consultants and production managers tried to put the operators in the best possible condition. They were asked to work more than before, but



in a sustainable way. On the first day of the actual beginning of the project, it has started experimenting with the progress of the new line to see where the study carried out worked and where it did not. The aim of the first two weeks was adjusting it from time to time. There was immediately an attempt to boycott the project by a line operator. The willingness of the project managers, with the support of the management, was to react immediately, talk to the operator in question and clarify the importance of the project in progress. The day after, everything was going well in brazing station, but problems with the wiring one began. At the beginning of the work, the activities regarding the wiring phase were not divided because of the operator's request to start and finish the same machine by himself without someone doing any activities to shorten the time necessary to complete the product in that workstation. Another operator has been put in that station to ensure that the cadence was respected even with that request. But the result didn't come in the first two weeks. The feeling was that the cable operator did not feel on board, not considered or was cheating, not finishing the machines in the time he was able to finish them before. The department head together with the consultants tried a verbal approach, but with poor results. A top-down intervention, an exchange with the head of production and with the human resources responsible was necessary, showing how much the company cared about the project. The two close boycott attempts challenge the motivation of the improvement team and show resistance to change. More than once, those operators had raised the issue that it was impossible to achieve the desired result. It was impossible to complete almost twice as many machines as before in a single line according to them. Even though the whole system had been changed, from the way materials were prepared and brought in line, to the division of activities in a different way, they were convinced of their ideas. Both had been working in the company for many years, and they were used to work in the same manner all the time and completing more or less the same number of machines per day. Convinced of this, they created a negative working climate and risked opposing the other operators to the project as well. Fortunately, these attempts have not undermined the strong involvement of other resources, which have always continued to do their duty and propose further solutions. It was necessary to replace one of the operators, but after this, the project went ahead much more quickly. In this way the environment created was very positive and the people involved felt more and more part of a team working together to achieve the final goal and continue to improve. The approach used in this project, from the technical point of view was to bring out all the non-value to balance the activities within the line, manage the external activities so that the line was always prepared, and the preparation kits correct. If the balance proved to be working and the line could follow the takt of the demand, the standard was created, otherwise adjustments and improvements continued to be made to achieve the expected result. The biggest difficulty encountered in this project was not from the technical point of view but in facing with people resistance that had been created over time, in that plant. The first step of consultants' approach was to pervade the new logic in the minds of the people at the top: until

that moment everyone was convinced instead that a production line was necessary for a few very similar kinds of products or even a production line was dedicated to a single customer. In this way, the workers always stay in the same line, specialising, for example, on the specifications of a customer, and this is lost in terms of interchangeability and multi-functionality of the operators, and in terms of productivity of the line. Once new logics were understood by the management, the production managers and the department heads were convinced that the objective was to have a smaller number of production lines, perhaps with a larger number of operators each, at a lower cadence and with a wider mix of products within it that allows to balance the individual stages of processing. Consultants have switched to the operators afterwards. As already mentioned, the new method has not been well received by all. The concept of cadence was a bit frightening, there was often the concern of not being able to complete their work in twenty-five minutes or, in any case, of having to run too fast to do so. Another project on an assembly line was undertaken in a different plant a few weeks later. From the technical point of view the projects were very similar between each other. What differed much was the working atmosphere. Operators were differently used to work. This meant that they allowed consultants to involve them and join actively the project. This different feature has led to different results. The objective set for this project was achieved in just one week. In the following months it proceeded together to make the new system sustainable and improve it more and more, with the participation of all. In the project mentioned above, however, the result was achieved with difficulty after more time. In addition, strong interventions and impositions were necessary.

One of the main supports that were received by the consultants came from the company's heads. Speaking with one of the leading managers in the company, the situation before the entry of Considi in the company has been briefly told. A relationship was established with a consultant from another company, and the first improvement projects were started some years ago. According to his personal opinion, for two years he came regularly to the company, and after a certain point, he came to carry out activities that were not well defined and without any clear objective. The management's approach in following, supporting and urging the consultant to move the work forward was not constant. All this happened because, after having overcome the first impact of novelty and enthusiasm arising from the presence of an external figure, it ended up considering him as part of the company and they no longer gave weight and importance to him. This showed the relevance of having shared goals and frequent alignment with management. Obviously, the results of the collaboration have not been excellent, and the company has started to look elsewhere. On the other hand, consultants' consideration is very different in the projects considered. The property was very present and demanded continuous alignments with both the internal resources involved and consultants. This was a sign of commitment and participation, for a renewed corporate culture. The economic factor had an impact because once the company invests money to pay the consultants involved in so many

projects, it has a greater incentive to be aligned with the work done over time. In addition of being satisfied with the progress of the projects, the owners were also aware of the development of the worksites and are motivated to go ahead with the projects or to start new ones if necessary. The motivation that has generated in this way means that they gave faster consent to changes or to meet needs, and the projects benefited greatly of it. Management had realised how important having an organisational atmosphere that encourages employees to engage in such projects was.

Another important aspect found in this company was the already existing structure dedicated to continuous improvement even before the entry of Considi. Some of the people involved in projects with the Considi team carried out this same kind of activities on a daily basis. In their own way, everyone was a healthy promoter of improvement. The presence of this factor allowed the concrete advancement of projects day after day. Obviously, if before the beginning of these projects, there were already people exclusively dedicated to activities of this type, this is nothing more than a great facilitation. It meant having resources that are not completely absorbed by the company routine and that can take charge of some activities to be carried out from time to time to advance the project more quickly and especially when the consultants are not there. Working in this way all the activities were carried out easily time after time. Since the roles are relevant, the head of this team had a greater specific weight in stimulating the progress of all projects. He was project leader in at least five projects with Considi activated between February and November out of a total of eleven projects in total. He represents the main sponsor of improvement in the company, as he is close to the problems of the company and of production. His approach makes him able to delegate when it is appropriate and to be kept up to date on everything. He believes on training and for this reason he inserts training courses when he sees the possibility and also has the support of the management. Its transversal and constant presence ensures that projects receive a boost to be carried out and that people understand their importance in the eyes of the company. For other projects, there were members of the board as project leaders, but with a less daily and operational presence. However, the certainty is given by the willingness of the management to change and improve, given that they have activated and continue to activate improvement projects over time. It's the case when leadership becomes sponsorship.

The level of competences found in the various people who they worked together was high. This factor was a facilitation to the work of the consultants. The good preparation of the resources allowed a faster execution of the activities and in the power to realize every possible solution that is designed.

Another project carried out in Rivacold, concerned the efficiency recovery of the production plant that manufactures condensers and evaporators, and is organized with machinery, presses, and departments. Another important need was also to control the progress and the work of the employees as the company was in a period of growth continuously putting in new employees. The

property had the perception of having lost control. The initial objective and the specific area where acting required by the property were not clear from the beginning. The project manager drew on his knowledge of the company and of the owner to try to understand what he may want, based on his memories and the complaints and issues raised by the owner over time. What was perceived through observation was that in the current situation there was confusion between the departments and the machineries, and the flows of materials were not well organized because new machines have been added somewhere to fill the empty spaces of the building. There was a lot of work in progress material between the individual phases. The department manager lives in the plant daily and hears the owner's concerns, so he suggested to start in the welding phase, that is the final processing phase before testing and packaging, to achieve an important goal, in a short time. The head of production, however, argued that welding is more a matter of skills and training, of absenteeism and rotation of people, not a purely technical issue on which to intervene. He saw more the problem in putting into a flowing stream the phase of manual assembly positioned after the pressing machines. He ensured also that the logic of preparation and being pulled by the machines that feed that phase have to be rethought. In such a situation, the consultant must ask himself or herself questions and understand where the best area to start is. On the one hand, he must make the owner satisfied, thus taking an area that he cares about, on the other hand he has to reach the result and identify the place where the company really needs help, and he has to follow the perception of those who live daily discomfort. The delicate work in this phase was therefore to make these two different points of view to coincide. It's normal that people who work in the same company consider different priorities. At the end, it was decided to start two separate projects. The first, with a vision and a higher range of action about analysis. The VSM analysis has been carried out for each technological family in order to identify the flows of every single product in the plant. At the same time, the pilot project in the assembly phase has been started with the aim of putting the pressing and welding phases into flow. The good intentions with which the project began and the common agreement how to base it was an element of facilitation for the subsequent course and final success of it.

## **The case company Alpha**

This company has started a path of improvement with Considi in the last two years. Many activities have been carried out and many kaizen worksites have been started over time. The areas of application have been various, from production departments with the application of new methods for autonomous planning, the SMED methodology in the machine station, the organization of the

workplace, to the warehouse politics, the technical office and the purchasing office as well. In particular, the latest project was undertaken in February. The entrepreneur's request was to review the whole organization of the production area to find opportunities for efficiency. A general assessment phase of the company was then carried out to outline the starting state, the as is situation of the company. All the activities and processes, productive and not, involved from the moment the order was placed to the moment the finished product was delivered, were taken into consideration. After the visit of the consultants, during the alignment at the end of the day, they shared the general idea arising from the visit. What the consultants found was a production and warehouse guided by the forecast of the commercial area that does not allow the production to be organized in a lean way. The finished product stock was very high, like the raw materials and semi-finished product stock, in order to meet the variable demands of the market. The back office placed orders without paying too much attention to what was already in stock, in production or when the newly placed order would actually be possible to be produced according to availability. The proposal was shared in a transparent way and was to start a path from the union of intentions and the creation of rules for the insertion of sales orders: only production area will decide how to organize itself; stocks will be no longer imposed; a finished-product supermarket will be used by the salespeople to watch and pick up from there; immediately after the production order will be released to replenish it. In this way, no more orders that people already know it will be impossible to produce within the time required by the customer will be placed. Then they worked also on stocks in order to better organize the processes and to shorten the lead time. This initial approach was therefore focused on solving first of all a problem of communication, management, union of intentions between the commercial and production areas, eliminating a bridge that has been created between the two functions, which care just about their own functional objectives. Sharing these aspects left the project manager unsettled, who does not seem pleased with the direction taken by the visit and with what has been shown to the consultants from the point of view of operations. What was observed and said at the end of the visit by the consultants was not perceived as having such an impact or as the starting point for changing things by him. At the end, after reflecting, the initial concerns given by the different point of view of the consultants were dispelled and the company decide to start the project. The proposed idea of the path was appreciated and even a small and isolated project in production, like on an assembly line, was proposed. For this reason, it was decided to set the work on two projects: one macro that aimed to recover efficiency in the whole assembly phase, the other in a specific product family. This pilot project required the creation of a supermarket of finished product that guides the logic of production for this family and create a physical bridge between commercial and production area. On the kick-off day there was a lot of participation and involvement to establish the steps of the project, the people involved, the timing and activities. The company has made itself completely available for the project and involved not only the project manager and the operations manager, but

also the management control responsible, the sales manager, the purchasing manager and the planning manager. An initial training course on VSM, Kanban and the Supermarket were also set up. During the first official confrontation with the property after the beginning of the project, the plant manager for ten years and advisor of the entrepreneur was opposed to what has been said. His great experience in the sector, which he has also gained in other companies, makes him a transversal figure that is able to move forward from the production area to the commercial area, up to the technical one. During the assessment phase, in which the consultants were left autonomously to collect the information they needed, although he was available for any requests, he never took too much interest on their work. Then, when consultants officially shared the analysis with him and with the entrepreneur, he did not share some of the points of the analysis carried out. He was firm in his convictions, he worked all his life in the sector, and he was sure that there was something wrong in the analysis. The 9-day lead time resulting from consultants' study and application of the VSM seemed to him an exaggeration. He said that in 5 days from the receiving of the raw material, the company usually completes all the manufacturing processes and deliver the product. However, he did not have the perception of all the processes that are initiated, interrupted and surpassed by the machines actually completed in 5 days. For each one entered and completed in 5 days, in fact, there were others that were slowed down and left in suspense because less urgent. These last ones were probably completed in about 12 days. These expectations increased the overall lead time and generated high WIP between the various phases. The disagreement in a futile issue as the lead time, is a sign of opposition to the consultants and to the improvement project that was emerging. It often happens that strong convictions of people with a great experience, lead them to immediately refuse an external opinion, of those who observe passively and express a judgment. These strong convictions have therefore reached even the entrepreneur for the closeness and trust he placed in that figure. He will certainly have been influenced by the reasons given by a person with whom he has worked for years and these reasons have led to the risk of interrupting or negatively influencing the project before it even began. Fortunately, the entrepreneur has listened to all the opinions but then let himself be guided by his intuition and decided to trust the consultants and carry out the project. By activating the improvement sites, therefore, the objective was to improve the management of certain processes and adopt new logics in production. Since September, the future or to be state, has been drawn up. The project will theoretically last until January next year, with the less and less frequent presence of consultants to allow the company to proceed independently.

A 5S project in the company had already been carried out at the time of joining the company for the first time. The first attempt before starting the pilot project, was understanding how that project was ended. Right from the beginning, the operators seemed to be little involved and slightly distant from the logics of the improvement projects. The feeling was that employees did not perceive these projects as useful. One statement was emblematic: "now, I have to work like before, or even more,

and in addition I have to clean everywhere too". What simply happened was that the 5S project had not penetrated the minds of the operators and had not convinced them of the real purpose for which it was designed. The 5S method is not about overburdening operators with cleaning activities, but about projecting people's minds towards improvement. This happened because there was no comprehension, no involvement and it means that instead of benefits, the company was achieving dissatisfaction from its people. The main goal of 5S and TPS in general, that is making the genba a better place, where ideas proliferate, was failed. In the first moment, while talking about the new project on a specific product family, employees were sceptical, they thought negative, like that production would double with the same number of resources, so they would work harder, and their conditions would have been worse. They did not know that TPS is based on eliminating waste and improving operations in order to make the workplace less heavy and more productive, using the same resources. In the same manner as 5S, if in this new project a solution had been imposed to the employees, after a first moment, it would have been rejected because it has been not understood and shared. The secret has been to motivate and train people, explain to them calmly and obtain their conviction. In the past, there was the tendency to stop after a satisfactory level has been reached. In this way it begins to neglect kaizen activity and stop at a certain level. This brought the situation back to the starting point because once the enthusiasm has disappeared, people behave as they did before. Obtaining people motivation was perhaps the only way to create an environment that is adapt for improvement. Make the change positive and perceived by all the people involved was also fundamental. In this way, after gaining a positive result of plus 5% On Time Delivery (OTD) on that product family, a new project proposed about levelling production and recovering efficiency in the assembly line was started. The higher margin was discovered to be on the last part of the production processes, thus field measurement of the time needed to assemble some models of coffee machines for the various stations started. The aim of the project was to have reliable data about the time needed to realize some new models currently in production, about which detailed information were not available. Once the technical analysis has been carried out, the consultant met with the project manager and shared the results of the work. After this meeting, the client decided to move on to the second phase of the project. The project manager strongly wanted to start an activity with the active participation of people. Often it happens that a technical solution is studied to best balance the production line and the activity in line starts. Behind his strong will, it opted together for a different continuation. It was therefore decided to proceed with the examination of the videos related to all the assembly phases of the products, in order to highlight, discuss and elaborate together the opportunities for improvement with a varied and proactive team. It has been decided to meet one day per week for some months and involve people from the technical, quality, production departments and even the direct operators in charge of assembly. Everyone was able to express its opinion. The varied team was extremely proactive to provide new solutions and ideas. Everyone was

involved and convinced of the huge contribution he was given. The result was satisfactory because several ideas for improvement emerged, both on the design side with the technical office, and on the suppliers' side. This choice of the project manager was not trivial at all and was a sign of his understanding and willingness to carry out improvement activities in the company. In this way, a moment of mutual exchange of opinions and ideas has been created where everyone can contribute and where the operators are the centre. They represented the production area, the heart of the company and expose the problems they encountered daily and made requests for improvement.

Despite more than two years of experience with Conside, the company has never wanted to follow the advice of equipping itself for the future with an internal resource that manages all improvement activities and that knows how to carry out projects with consultants and company resources. Complete a further step in its transformation process, that is to equip itself with a figure dedicated to continuous improvement, has not perceived as important and fundamental until that moment. For the past two years, a consultant went about twice a month. If they have had so, even with a low number of annual days of just updating, alignment and support to this new figure, the improvement activities would certainly have gone on continuously. The internal resources otherwise associated the activity to be carried out with the imminent arrival of the consultant for a long period of time. For this reason, the consultant told that the work was proceeding at a low pace. The company has grown in the meantime and was often overburdened with work. The lower rate of the project depended on the actual inability of the company to carry out these activities as well, because given other resources to cover the normal course of daily activities were needed. In this sense it has happened several times to have many pre-set activities in one day, with several operators. The lack of organization has led to carrying out just one of the five pre-set activities during the day with the consultant. The result was a damaged relationship with the consultant, who felt that her work has been undervalued, with a client who pays him not to do what she could. This does not mean that the path taken until that moment has not been positive. A lot of activities have been carried out in more areas from planning, production, warehouse to design with important results in terms of reduction of setup time, shortening of the overall lead time and reduction of raw materials and semi-finished. Finally, in the last project cited above, something changed, and the company has realized the importance of having a project manager that takes care of the activities' development. It was the only way to ensure a different daily routine to carry out activities of this type.

Another important activity started over time in the company, was to establish a weekly meeting for the exchange of problems and the performance. Every Monday morning, department heads and management meet for about 15 minutes to discuss issues previously on the agenda. On a specific meeting, for example, the topics to be discussed were the deviation between planned cycles-times on BOMs and actual ones to understand how long a certain product actually takes to be completed, the delayed arrival of material for prototyping, and mould maintenance. The latter covered in



particular almost all the time dedicated to the meeting and involved all the partners of the company because it was very sensitive for them. The department heads did not actively participate in the meeting and ended up not presenting their problems. They got used to the presence of problems, because they face them on a daily basis and solve them. The interested people and some of the partners already knew them because they lived them during the week, so at the meeting nobody brought the problems encountered during the week. The heads of department's silence during the meeting could have legitimately been interpreted as "I don't have problems", but it was actually more similar to "I'm used to deal with the same daily problems, so I don't need to bring them back here". During the meeting the word "problem" scared people. For this reason, they talked about it as little as possible. What the consultant has tried to convey about problems was that there is a substantial difference between the perception of the problem as an opportunity to improve and as a direct and personal attack on the way people work. What happened was that, for instance, a product did not come out in the planned time, and the clear existence of a problem was seen at first as a search for who was responsible for it rather than how to make the product come out anyway. The result was that problems were not discussed or that if the situation did not seem so tragic, there was no need to expose these problems again. The objective of this moment of sharing, however, was to make everyone aware and able to decide how to deal with a problem and make sure that it did not occur again. It concerned something different from what they did to temporarily solve a problem in everyday work. Here it emerged the lack of perception of the difference between definitive and shared resolution and temporary solution or adjustment. After this moment of silent observation, the consultant intervened and explained again the real usefulness of the meeting. Now people know that without a clear indication, they do not know where to work, and this constitutes a block to problem solving. They have realised the importance of becoming aware of what's happening in the company, in a special place such as the meeting, and proposing real improvements. They know that the problems faced in everyday life and solved at the moment, can arise again, so they must be addressed with the awareness of all. In that moment a further step towards the growth of the company's culture and therefore of its people has been achieved.

The entrepreneur was fundamental in the initial choice for the path that the company will follow in the future. The guidance and presence of the entrepreneur was fundamental throughout the process. Like any reputable entrepreneur, he is filled with good ideas and has a great knowledge of the business world. He is constantly looking for new inspirations and new possible ways to elevate his company. The company had a low state of necessity. It was performing very well, so there was no need and attention that is used when the situation is critical. The perception of the importance of the project was however felt because the entrepreneur saw in the TPS one of the possible ways to increase the competitiveness of his company. For this reason, he decided to undertake a path with the aim of improving the efficiency of the plant, which therefore involves the entire company. The

entrepreneur's attitude and his trust in the consultants have always been a fundamental element for the progress of the projects. In this case, he is the project manager, who gets updated every time at the end of the day and tries to get ideas and considerations from the consultants. If the company continues along this path, it will depend on many other factors. But the entrepreneur's predisposition has certainly helped the beginning of the project.

At the beginning of the project, the level of skills of the people was not very high. This aspect has in some respects slowed down the progress of some activities, which in other cases would have been carried out quicker. However, this characteristic meant that people were completely available and willing to learn as much as possible. The consultant started therefore an ongoing training process, which allowed all the resources involved to grow and carry out the ongoing kaizen worksites on their own. In this sense, the initial skills gap was by no means a constraint on the development of projects in the company. The availability and positive personal component were the key ingredients to drive improvement in the company.

## **The case Paradisi**

The key moment in the history of the company occurred in 2009 when the economic crisis spread in Italy. Given the small size of the company, at the time less than 5 million in turnover, its future was put at risk. In fact, more than 50% of the turnover was linked to the two or three main customers, who, having been affected by the crisis, have consequently reduced orders at Paradisi. In this condition of great uncertainty and fear, many would probably have seen in the reduction of staff the only way to survive. Instead, Paradisi 's answer was a series of major investments to diversify production. The entrepreneur had the courage to see this situation as an opportunity. The opportunity to stop from the chaotic routine, put the company in order and make his people grow. Before starting that path, of course, it was long wondered if that was the right way to go. His great intuition was to find in a time of decreasing work and turnover, the opportunity to train and invest in people in a context that was changing. The company operates in a market where customers demand high quality products on products that are almost entirely machined by lathes. In order to respond to this request, he decided to work on the process, aware that, as a result, the final product would have also been improved. The above-mentioned crisis was therefore an opportunity to review everything in the company, from the processes, to the individual activities. From the outset, the management of suppliers and orders to obtain favourable economic agreements were dealt with. First projects were started together with his own people, mainly on production machines. The results achieved were

good. After the course of the crisis, the entrepreneur realized that he could no longer do better because he no longer had the internal skills to lead by their own. So, he sought support from the outside. He had always worked to increase the performance of the individual lathe or department without looking at the entire value stream. What the consultant observed was that there was a block after the machines, particularly in the washing department, and in the sorting to subcontractors and shipping to the customer. All the work until then had been done on the machines, that is on the activities of value for the customer. The other phases blocked the entire flow but were not perceived as such. The first project was activated right where the flows were blocked, creating separate flows. First 5S sites, first visual tools to direct products were implemented. Even though the entrepreneur wanted to continue working on the efficiency of the machines, being capital-intensive, the dialogue with the consultant allowed him to open his eyes. It was 2015, when the path with Conside started with the development of several projects. The first one concerned the cleaning and improvement of the production departments from an ergonomic point of view. It lasted about 2 years. It came about because of the need in the industry as turnery enterprise has historically been a noisy and dirty place because of the machineries they use, where oil and swarf are perpetually dispersed on machines and floors. Faced with this reality and the difficulty of attracting new resources, especially young people, the entire plant was cleaned up and small adjustments were made from time to time to prevent grime from reforming, such as removable bowls on lathes or anti-vibration feet on machines that are no longer fixed to the floor to reduce the acoustic impact. Operators were made responsible for keeping the workplace clean and immediately removing an oil stain when it appeared. Initially, an external company was used for the weekly cleaning, but then it was decided to carry out the cleaning on their own in order to obtain the involvement of everyone. The result was to become more attractive to the outside world. Today the factory shines, there is no more oil in the floors and the quality of the products has also increased. The entrepreneur's words on this subject are emblematic: "This is not an end result, meanwhile we try to keep what we have achieved. Let's move on to other worksites. Where it is clean, the operators work more calmly, they are no longer afraid of falling, they make quality products and grime no longer generates waste". Another project concerned the different departments that compose the entire production area of the company. There are four distinct departments (one for final assembly, three for turning) and have been made autonomous. Each one is like a single company. This responded to the necessity of following everyone's needs, which became complicated if everything was still to be channelled in the same people. In particular, on the personal side there was the need not to leave any department vacant. Today, each department manage their own staff work shifts and holidays. On the purchasing side, only what the individual department needs is ordered in the same way. This last setting has made it possible to reduce the stock by 200.000€. Another project related to inventory concerned the reduction of packaging boxes to be kept in the warehouse. From this intervention was then taken the opportunity

for their standardization in order to reduce the possible types. Another project carried out was the reduction of the forklifts from two to one, with the aim of eliminating them completely and never more placing the materials on the top. The turning departments have been reorganised with the same machines in a mirror-like way. In this way it was possible to spread the skills of the operators and to take or move them from one department to another according to the needs without any problem. In each department, the machines were also placed in two parallel rows, leaving a central corridor that allows anyone to pass through and check the status of each machine at a glance. A single department can be managed by only three people, each with a clear task. With regard to the inclusion of young people, on whom the company relies heavily, he chose to make them as comfortable as possible, leaving them to work among themselves. The entrepreneur says jokingly that older workers "take away the smile from the youngest, so after the training period, at the cost of doing some damage, we let them work just among them". People were put in the centre and made able to express their own capabilities. They were involved in the company activities of transformation. But it took time, people were not ready to change right away. Some people have shown resistance. The approach used by the entrepreneur and the consultant was progressive not forcing at all. For each change there was no attempt to impose anything. They explained and tried to make people understand before changing things. Nevertheless, all the projects have been always made with his people. Each department is even now structured as if it is a sort of separate and autonomous enterprise. Each team is responsible for its own development and needs. The involvement is very high because people are responsible and autonomous. There is a goal and it is up to the people to reach it. The entrepreneur has always tried to offer training and skills development courses but there was still a big gap between him and his team despite the attempt to involve them. It has happened many times that the opportunities were seen only by the entrepreneur or that some problems were not recognized by the employees. Some activities also ended up being imposed. It was decided to activate some activities of which the operators were not always aware of the importance. Operators saw other problems. The entrepreneur's awareness and vision were greater. This factor generated clashes and moments of difficulty. Involvement always remains the main ingredient in the projects by the way.

Many of these projects were carried out independently by the company, without the need for constant support from the consulting firm. This was possible because the entrepreneur has shown great vision and progress in this path. The fundamental ingredient that he was able to grasp was enhancing the value of people in every project. This has led to obtaining more than just people dedicated to improvement activities. Now everyone in the company thinks and strives to reason with a continuous improvement perspective. It was therefore not necessary to have a team dedicated to these activities, because the company has been successful in bringing into everyone's mind that this orientation must be present in the performance of daily activities. Today, in fact, improvement

activities continue to be carried out because it is believed that they are important and necessary. This impulse for improvement stems precisely from the inside, from the ideas of the property and has led the company's turnover to almost double since 2010, reaching 9 million in 2018. It is the result of an excellent business culture, built step by step and aimed at continuous improvement. Every possible projects of cleaning, elimination of waste and growth of people is born from this culture. Considi 's help and guidance has certainly accompanied them on the path to improvement, but the important results that have been achieved are certainly the result of the dedication and propensity to improve of those who guide other people internally.

### 4.3 Cases confrontation

Figure 6. Cases confrontation

	Rivacold	Company Alpha	Paradisi
Convictions	X	X	X
Resistance to change	X	X	X
Involvement	X	X	X
Sponsorship	X	X	X
State of necessity	X	-	X
Lean team	X	-	-
Business culture	X	-	X
Competences	X	-	-
Pre-start expectations vs Proposal	X	X	X
Project Characteristics	X	X	X

Personal elaboration

The table above is structured with the three cases presented on the columns field, while the ten key-factors on the rows field. It shows the comparison of the cases in terms of factors' presence or

absence. If the factor was present in the case, the relative box contains a cross, while if not or if its content is very low a dash has been inserted. The purpose of this comparison is to critically analyse the results obtained in the different selected cases. All the projects are related to the logistic-production area and have been carried out in different companies. The first two are very similar in size and area of activity. The last one is an SME. Despite the different characteristics of the company, the factors which have strongly influenced the course of the transformation process, are the same as those that acted during those in the two larger companies. For this reason, it is interesting to highlight the differences and characteristics common to the projects, although they were carried out in different environments, with unique contexts and people. So, during their presentation a lot of attention was paid to the identification of the ten factors and they were taken under observation. What resulted was that not all factors were recognised in all cases. Some were absent in one or more cases and this led to consequences for the project. Others were present in all cases, but their manifestation occurred in different ways. This discussion will be held for each of them. It was also recognized that some factors are essential to achieve satisfactory and lasting results. Generalizing even outside of the projects considered, these characteristics remain valid.

The characteristics of the project is the factor that has been left aside the most. While presenting the cases obviously it has been considered because the nature of the project and its difficulty directly influence which kind of project is going to be carried out. But this study does not attempt to give particular emphasis to the technical characteristics of the work both in terms of its design and execution. The technical choice and execution of one methodology rather than another, its adaptation to the context and to the needs encountered are considered secondary to all the other factors that guide the consultant's approach. The former is the result of the know-how and experience of the consultant, the latter regards whether to be more cautious, whether to be more present and pressing, whether to directly involve the management, whether to take the field operationally, whether to train, etc... For these reasons, the technical characteristics, always keeping in mind their importance, are not considered to be so determinant as the other factors listed above that guide the consultant in the tortuous path of being heard and push change in the company. Much emphasis is put on the influence and reactions of the people involved. Ōno and Wakamatsu's thoughts which have been extensively discussed in chapter one, are useful for this purpose and can be reinterpreted in the concept that human ingenuity and people are more important than tools and methodologies. In Rivacold, the projects considered were complex from the technical point of view. They regarded the restructuring and the change in most of the production and supply logic of the lines. It was necessary to balance the processing phases for each product part of the production mix that was produced in these lines. Rules and ad hoc solutions have been studied to manage the work of the operators. Several construction sites have been activated in the Alpha company, but the most recent project chosen did not involve any particular difficulty. Although similar to that of Rivacold in the area

of activity, that is the production line, in this case, however, it was not intended to revolutionize the logic. As a result, the technical complexity of the project was lower. In Paradisi also several improvement sites have been activated, many of which provided for activities of balancing the flows and processes towards the outside, of support and training of the people. The technical specifications of the project, even in this case, were not very complicated, given the small complexity that concerns the company.

The next factor that was considered and immediately encountered in all three cases, was that of people's convictions. Starting from Rivacold, just in the days of the official departure of the new assembly line, consultants have clashed with the traditional way of thinking and working of people there. After having worked a lot of time in one way, they were not benevolent and willing to change their habits. From here the operators have shown resistance, opposing with their own attitude to the attempt to introduce a change. This happened also in Alpha company, where a high-level person, has repeatedly questioned the work and explanations of the consultants. In Paradisi, it was also necessary to give the operators time to understand the reason for these activities and make the changes calmly. These two factors, if not properly addressed, could have easily blocked the continuation of all the projects. If no one had taken counter-actions, the projects in question would not even be halfway through. To break this resistance, consultants have asked the support of the management in Rivacold, where they leveraged their positive convictions and push them to speak firmly to the operators. If, as happened, the objective was set and the management was motivated and supported the consultants, dealing with unforeseen difficulties became easier and led to results. Without solid and constant support, this type of project would have no future. Once the damaging behaviours had been defeated, the operators were involved, made part of a team. They were explained that everyone's contribution was fundamental to the success of the project and that this success represents, first and foremost, their own success. The same thing was also done in Alpha company with a varied team of people, part of more business functions, which collaborated as never before and offered great opportunities for improvement. In Paradisi, given the size of the company, operators took on even more responsibility and become increasingly aware of their role and the attention they have to pay every day in seeking waste and opportunities for improvement. They had even the freedom to manage their own department, together with their colleagues. Involvement became a key feature of the company's approach. Without breaking down beliefs, blocking attempts of resistance to change and involving all team members, achieving final success would have been probably impossible. In all three cases, the consultants had to contend with these aspects, the common solution to solve them was the same. To do so, in all cases, the consultants would not have been able to succeed if they had been left alone. Only in this way it was possible to achieve the desired result. The consultant is an external figure, to whom the company's employees are not accustomed to listening to. By their nature, they sometimes tend to see their presence negatively.

They erroneously tend to perceive an atmosphere of questioning of the individual. When problems arise, there is a tendency to pass the problems on those who are making changes. In this case, doing it on the external figure, who has not lived the company situation for many years, is an obvious thing. This means that having support and finding in some internal figures of the company real sponsors of change projects, is an additional fundamental weapon for the work of the consultant to be successful. If internal people embrace the cause and push others to move forward and believe in the project, the consultant is clearly in the best position to help the company to continue on its path. This was the case at Rivacold, thanks to the presence of strong corporate sponsors. First of all, the entrepreneur and his family believed very much in the work of the consulting company and in the many projects activated. They were aware bringing change in the company and supporting others in leading that development took time. The head of the improvement team was additionally at an operational level involved in most of these projects and provided daily support for their progress. Company Alpha took time to understand the importance of this factor. For about two years, the company has never pushed too hard and focused its attention on these projects. The entrepreneur gave the indication that the projects were being activated and believed in them, but he never had a dedicated structure to manage these projects. If no one cared about the activities when consultants were not present, inevitably it was wasting valuable time because simpler activities, which did not require the presence of experts, could have been carried out during the week. Finally, after two years of activity together, it was decided to appoint a project manager who would take care of the active projects and involve the professionals in their daily activities. In Rivacold everything was facilitated by the fact that, since the entrance of the consulting company, an improvement team was ready to carry out the existing activities and new ones. The new push generated by an approach of collaboration and support in Alpha company has led to considerable improvements and has given a shock to the environment that was slow to understand the importance of having a continuous tension for improvement. In Paradisi there is still no figure specifically dedicated to improvement. Due to its small size, the company has just staff who take care of the daily activities. However, the path started ten years ago has made everyone in the company understand the importance of researching and reducing waste and making the work environment a better place by their own. Each operator promotes improvement and carries out their own ideas in their daily lives. This way of thinking has derived from the entrepreneur in the first place. He is the main sponsor in the company because he is the one who has decided to devote time and resources to improve, to look around, to understand their own reality and to think about how to improve in everyday life since 2009.

As for the internal skills possessed by the companies, different situations have been found. In Rivacold the level of skills was quite high. The operators on the assembly lines were highly skilled so this peculiarity led to the possibility of experimenting solutions without too many risks and to carry out projects more quickly. In company Alpha and in Paradisi instead the level of competences was



not so high, so they decide to immediately activate more intense training paths. With these moments dedicated to building the future skills of people, it was therefore possible to carry out the necessary activities with extreme agility. The initial absence was a slowdown, but the predisposition and availability of the people made it possible to recover and move forward quickly.

An important factor and that has encountered different configurations in the cases examined, is the state of necessity. In the first case, the property, despite being in a period of growth, has understood the strong need to engage in restructuring the company. Over the years many organisational and structural aspects had been left aside to focus on growing more and more, thus the moment of working carefully to fix them was arrived. This strong commitment has generated great dedication and drive towards employees. Everyone in the company knew how much the property cared about the success of improvement projects and that delays, and failures were not allowed because the company had no more time and other opportunities to permanently change some old logic. The same factor was present in the Paradisi case, where, however, it was a different reason that triggered it. The company had suffered a lot from the advent of the economic crisis and was in danger of not surviving to it. What guided out of the crisis was partly fear and partly the awareness that without changing the company and eliminating waste, there would be no future. The result also in this case was a strong push, perhaps even greater than the one found in Rivacold, given the emergency situation. In Alpha company instead, the state of need was not urgent at all, because the company was performing very well, and nobody was bothering to take such a positive moment to look around and try to improve more and more. Several projects had been started in two years but the intrinsic commitment that a situation of urgency and necessity provides was absent.

All the cases presented may not even have existed if during the first moments of relationship build-up between customer companies and the consulting firm, something had gone wrong and the companies had decided not to continue. Even if the project had been started, there would probably have been no support if such situations had occurred. The factor of the confrontation with company's initial expectations is therefore crucial. Given that these moments have been positive in all three cases, it does not have the other side if they were negative but is certain that the entire projects would have certainly been put at great risk. The relationship between the two bodies is fundamental and must be built with care and attention from the outset. The consulting firm must understand the needs and requirements of each company. Rivacold entrepreneur wanted to see his press machines in operation all the time and he perceived in a negative way the fact that the expensive machines were stopped. However, he did not notice that the downstream processes were bottlenecks and could not dispose of all the semi-finished products produced by the upstream presses. The task of the consultant was to put together the real needs of the plant and of the people who lived there with the will of the entrepreneur. In the Alpha company, perceptions were similarly different, and consultants took time to explain clearly and transparently what their ideas were due to the

observation. Even in Paradisi, there was no immediate alignment with the consultants. People who live a reality on a daily basis can hardly see beyond their convictions. Once the real needs were understood, trust is given, and the project activities can start.

Some of the episodes told during the cases presentation, such as that of the weekly meeting held to present current problems in the plant but which actually had a completely different purpose in Alpha company, are intended to show the company in a more intimate and closely view. The clumsy attempt to cloud the problems, the habit of finding temporary adjustments rather than permanent solutions, are a sign of the absence of a corporate culture that is aimed at improvement. After the intervention of the consultant, the people involved understood the right way of thinking, but for this thought to be radicalized and reach the whole company, from top to bottom, it takes a long time. Rivacold, on the other hand, is on the right track, where the tension and the desire to improve that starts from the management has gradually penetrated even downwards. People understood that something was changing, that property was more present than before and that different results were required. Before it was not required to train other colleagues, now it is assessed to provide a final judgement of the person's hard and soft skills. All the elements together testify a change in Rivacold's corporate culture. In Paradisi everything started from the entrepreneur's vision and his great depth of thought. Even though the different dimension, made of limited resources and impending dangers, those who had the responsibility to lead themselves and other people, chose to take a different path, to look consciously at their own reality, to consider factors that previously were not even taken into account and considered irrelevant. First of all, the question was what the company could do to survive. The answer was as simple as not so obvious: to improve. They have therefore proceeded to train employees. They did not give enough weight to this aspect before. Everyone was taught to work more transversely, and work sites were set up to improve the working environment and become more attractive to the outside world. Over time, people have understood the importance of what they do every day and have become more responsible for that. The weight of everyone's ideas became relevant and everyone was involved and pushing in the same direction. The entrepreneur has always believed in the potential of his people. He is aware that much can still be done because it never stops improving. What emerged towards the end of the path taken together with Considi, is that the great vision and predisposition of the entrepreneur to lead his company and in transferring different values to people, were fundamental elements so that the company has then proved to be able to continue even independently with the same activities. When such an element exists, achieving an objective and the success of the project itself is less complicated. Beyond the individual project, the company is therefore able to continue the path of improvement on its own.

As has been explained, the corporate culture is one of the elements that makes the difference in delivering success. Other factors that have been shown as fundamentals in the cases analysed are involvement and sponsorship. These factors are in relation among them. People involvement and

business culture are shown to be two of the most important steps in introducing TPS. People start to commit themselves with all their might to a job they are convinced of it. If people are reluctant and see improvement activities only as an extra burden and not as ideas to make their work better, this means that the concept of kaizen and daily pace of improvement are not penetrated radically into the company yet. These are the main reasons why, although the results of the projects carried out have been positive overall in all the three cases, in terms of corporate growth and TPS logic level of penetration, company Alpha is the one that has lagged furthest behind and probably the one that would struggle most to continue alone its path to continuous improvement. In companies like Paradisi and Rivacold instead the lean transformation path has started, but as Mr. Paradisi says “we are far from reaching the end”.

#### 4.4 The final pattern

The individual key-factors have been deeply explained, first through the literature point of view of how lean or TPS logic introduction into companies occurs, then from real cases where they are present. Their possible effects have been investigated in different situations during the cases confrontation. In order to effectively guide a correct approach to the lean project, a final pattern has been created. This pattern constitutes a common way to approach such projects. The results achieved showed indeed that the factors explained above are common and can be found even in other projects that haven't been analysed during the dissertation. This is possible even if every company is totally different from another one as each has its own characteristics, sector, products, culture, thinking, rules, habits. As anticipated during the introduction, the reason is that every company is composed by people. As they are totally different from each other, what will change is the approach used to "get them on board" of the project, but the determining factors both in positive and in negative remain the same ones. Each factor can be present or not, its level can be high or low, and relative consequences derive from it. Analysing them is fundamental in order to considerate every possibility that enables or slows down the pace of the project.

The pattern places perhaps the factors analysed so far in the order of how they occur, as when the situations from which they arise take place. They are perhaps organized according to the macro-phases of the project's development. This model serves as a guide for the consultant in choosing and modelling the approach to every lean project carried out in a company, since before the beginning of the project.

1. The first factor is **pre-start expectations vs proposal**, as it concerns the zero moment of the project where, after having established a contact in some way, the consultants visit the client company and have to accomplish a clear idea of what could be the company's necessity to be addressed to. From that moment on they have time until the presentation of their project proposal to put together all the aspects that they have caught in talking to people and looking closely at the company. Already at this stage, a general idea of what will be the technical **characteristics** of the project, or how it will be carried out, is made and shared in the proposal. The presentation is the ending moment when the consultant gets the feedback from the company. If positive, it can move on to the actual first operative phase of the project. If not, the project will have gone up in flames. In this phase, the **state of necessity** of an intervention for the company also emerges immediately. As explained in this chapter, depending on it, the expected results, attention and determination to the project will be different. The consultant has to evaluate the impact of this variable and always keep the attention and commitment to the project alive, showing the results as the strongest leverage. The challenge is creating a state of continuous need for the company to evolve, regardless of its financial situation. The consultant has thus to make the management understand the importance of modifying the common way of thinking about change, so that it is seen not as a solution to something that is going badly, but as the tension to always achieve better results. Doing it takes time and dedication. Entering into the minds of people and harming the beliefs mentioned above is necessary.
2. From the kick-off day, the consultants start building a relationship that will facilitate future collaboration and transmit to the entrepreneur and management 's minds the ideas and logics of continuous improvement. Having the support of the upper levels from the outset and making them understand the need to be the main **sponsors** of change in the company, is necessary so that all the people involved later know that the whole company wants to go in this direction. An important goal to be transmitted by consultants is therefore that the management is always closer to the genba. This is the place where more value-added activities are performed, and the company has to be put on its service. Carrying on kaizen activities must become rooted in their style and culture. Without the interest and involvement of the management, any training is useless. From this point on, it is clear whether the company has a culture that limits or facilitates the development of these types of projects. Consultants must help the company to create and spread its **culture** of improvement so that it can take roots everywhere and in all the people who work there. If consultants are

successful in doing this, they will allow the company to make a great leap into the future, thanks to the developed ability to carry out these activities independently.

3. In the following phases of the project, from the assessment phase of the "as is" to the construction phase of the "to be", consultants come into direct contact with the people of the company, with those involved in the most operational processes. If in applying methodologies and tools, from a technical point of view the effort to adapt them to a specific case is minimal and the approach of consultants is almost the same, tempered by their own way of working, they have also to adapt their approach to other specific characteristics. It changes considerably. To respond to such specific needs, the consultant has to get down to the part, fully understand the existing dynamics, and design a new solution, which solves the specific problem in each project. It is here that they measure themselves with the ability to be heard and to transmit a clear message, rather than to teach a methodology. And it is here that the strongest resistance commonly is met. When the practical part of the project starts, difficulties arise and from these situations **the convictions and resistance to change** of people emerge. They require interventions. When this happens, consultants must not allow the team to be subjugated by people's opposition. If the company has chosen a path, which suddenly turns out to be more difficult than expected, the fear of failure can arise, and the people involved can be demotivated. The consultant must therefore commit himself or herself to break down the barrier created by those who oppose it, bringing them to the side of the team as well, and leading everyone towards the same direction. The best way to deal with convictions is demonstrating the validity and applicability of TPS also in their reality through results. The power of real and tangible facts is much higher than that of simple words. When it is still not possible to show the concrete results, he has to reassure people and continue to work. A positive attitude and a readiness to explain and dispel doubts will ensure afterwards when trust will be gained, and old convictions demolished. In doing so, consultants cannot move on their own. For such an intervention to be successful the management must agree to completely change the way of working and support the consultant in transferring the new method. From this moment it is possible to see if the ownership, in addition to having understood in words what has been said, has made itself available and is changing its corporate **culture**. The people at the top must therefore be updated and made part of the change underway. In order to break down the resistance of the people, the intervention of who leads is not enough. It is also necessary to make them understand that the process underway concerns them. They have to be **involved** and made active proponents of change. It is important that everyone knows that the company wants to get people who are in a

condition to think, who know what is expected from them and that the property supports them. They are the ones who intervene to improve their workstations and no longer see solutions imposed from above. To involve people, it is essential to explain and show concretely the reasons why the company wants to adopt the new production system and make people involved and participating. Consultants have firstly to work on people because no transformation can happen and proliferate if people are not convinced and moved from their own. Getting them to experiment with new solutions, building future **competences** by testing means empowering them and helping them to grow. If management is strongly convinced that the project undertaken is the best choice for the company, then they must ensure that the project progresses decisively and continuously. Leaders become **sponsors** of change. From an organisational point of view, people have to be supported and have the opportunity to devote themselves to improvement activities. A well-organized company that devotes the time required to the project is an excellent place to carry out a process of lean transformation. Even better if the company has a **lean team** within it. This means that the work started in a particular department will already have someone ready to extend it then in others, until it crosses the whole company. In this kind of companies, consultants have much less work in terms of training but must get used to leaving room for internal resources and allow them to get used to carry out their activities independently. In this way, they can become the bulwarks of TPS within the company. This allows the consultant to take a guiding and supporting position, where the largest part of the activities is carried out by the members of the company. On the other hand, if these conditions are not present, consultants' work must be more practical and persistent. Let them experiment with their hands is essential, but they must make sure that they have understood the logics. Otherwise the risk of failure and abandonment of the method is possible. If this happens, then it becomes more complicated to convince them to start again.

4. Once the project has been completed, on the basis of the result obtained and the final overall judgement, the client company decides whether to continue the collaborative relationship by starting one or more new projects together with the consulting firm. If the positive factors cited in the previous phases are present, and in particular, a **business culture** that drives the processes of improvement, a constant and positive sense of **sponsorship** and **involvement** of people, it is very likely that the company will continue the path of lean transformation in autonomy. To do so, it will certainly have to equip itself with a **lean team** dedicated to these activities and responsible for continuous updating towards the management, or, even more

desirable, to ensure that people it already has, understood how much important taking care of improvement activities on a daily basis is.

## **Discussion and Conclusions**

During the previous chapters a journey through the world of lean consulting projects was addressed. First of all, the theoretical framework on which these projects are based was built. This is the literature on the Toyota Production System and its reworking in a Western key under the name of Lean Thinking. Immediately after the framework was expanded to include the way in which these logics and principles are introduced into companies, thanks to various scientific articles. At the end of the second chapter the context of consulting companies' action was presented, in particular the one of the selected company Considei, that operates in the field of operations and continuous improvement consultancy in Italy. The framework created was used to determine the main factors that influence the progress and possible success of a lean project conducted in a company with the support of consultants. In this interaction come into play several aspects belonging to different categories. The analysis has led to highlight ten different factors that are groupable into four typologies. For the project to be successfully completed and lead to an extension of the relationship between the two bodies, it is necessary that these factors are considered and addressed in the right way by the consultants. Subsequently, it was highlighted which are the most important ones that lead the company to continue the path towards continuous improvement independently, without the need for external support. As proof of the validity of the study carried out, three real business cases that showed how these factors act within different companies with their own dynamics were presented. In the comparison between the three cases, each factor has been put into inspection in order to evaluate the differences and the relative consequences of each of them. Important aspects that can be generalized to many other real cases emerged. The relational and personal components, such as the involvement of people, and the organizational and structural ones, such as sponsorship and corporate culture, were highlighted as the fundamental ones, without which a company is not able to undertake successfully and durably a path of lean transformation. Based on the findings, a final pattern that can guide the consultant in each phase of the development of a project was therefore formed. It aims to identify and focus deeply consultant's approach on the key factors to be blend with the unique and fundamental characteristics of the specific company where the project is

being carried out. If a consultant takes into consideration all these factors and consequently takes corrective actions when some are missing or underestimated, the progress of the project is certainly facilitated. Taking back the ten key-factors, the consultant's approach can perhaps be modelled according to their presence or absence. Any factor can be dealt with, but first of all the consultant needs to understand if the management and the property is motivated and convinced to carry out the project. Telling that the project is being done it is not enough, but it also necessary to encourage people to take it forward, to make decisions when necessary and to support the people in the field. Once the necessary support is achieved, the next fundamental ingredient is the involvement of people that work in the operative processes. Involving people can mean making a radical change in the way tasks are designed and assigned to employees in the company. To use an example about the 5S methodology, that is useful to set in order a workstation but without the last S, that is "sustain", the methodology is completely useless because the condition achieved simply don't last. This means that TPS is not something that can be imposed from above and implemented with reluctance of the participants. To take roots and stand it is necessary that who work daily in the productive heart of the company, are convinced and motivated to look for better ways of working and continue to accumulate kaizen every day. To do this, it is essential to have an organization where everyone works with awareness of the problems and is actively dedicated to improvement. By acting in this way, the whole company can understand the true meaning of improvement projects, that is, to engage its people, all together, in the continuous fight against waste and in the search for new solutions that allow to improve more and more. Companies that have managed to internalize this model are those where not only the production area thinks about how to improve, but also the technical and administrative area, reflecting on how to manufacture quality products at a lower cost. The difference lies in people. People are the most important part in changing an organisation according to TPS. If they consider the renewal of production as their own problem, they will strive to make this change successful. Consultants must initially ask themselves what's the impact of a gap of competences among employees in achieving the required objective. He has to assess all the circumstances and to keep in mind that in case of lack of skills, more effort will be necessary. But competences can be built, the hardest part is making people change. It is also to be transmitted that kaizen is not a single initiative, is a step by step path and to make it work in the future, people need to be involved and think, because if the ideas and the solutions come from the top, they are not using their intellect. If ideas are the outcome of those who have to carry them out, the results are better. Even if at the beginning it needs more time to teach people, if people are involved and they perceive their ideas are important, the company is building an environment where kaizen continues.

In the current context where Italian companies operate, it is increasingly fundamental to develop the concept of multifunctionality of people and resources. According to their own characteristics and style, each company must be ready to face new challenges and respond concretely to unforeseen



threats and opportunities. The work behind this dissertation takes into account that each company is unique. To design a common pattern of action for a consultant who carries out a project in any company, it has therefore considered all the determining and common factors that characterize companies as organizations of people, made up of structures, hierarchies, rules and habits. As it is true that each project can be approached following the guidelines of the identified pattern, it is also true that each company can find its own way towards continuous improvement. There is not a single solution or path that can be followed by each company and lead to the same results. If there is a combination between management and employees' intentions, then each company can embark on its own path of growth and achieve enormous results. It's a simple choice that requires very difficult to reach characteristics, like commitment, devotion and courage. The consultant's work is only successful if at the end the company has understood the importance of taking this path and is convinced of this choice. The consultant must gradually help to create a corporate culture in the company that helps to train people who can think, make choices and know how to solve problems. It is by leveraging the man and the skills that companies can cope with the changing situations that arise and their need to evolve consequently. The consultant has to make companies understand that beyond their sector, having a genba that generates value makes the difference and only by placing the man at the centre of their interests, it is possible to achieve this purpose.

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