

POLITECNICO DI MILANO
Master of Science in Management Engineering
School of Industrial and Information Engineering



POLITECNICO
MILANO 1863

**Development of a Lean Assessment Tool
and Methodology for Small and Medium
Enterprises in Italy**

Research carried out with the help of
AlzaRating®, Industrial Management and the
Lean Excellence Centre at Politecnico di
Milano

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Academic Year 2018/2019

Acknowledgements

Jorge Peña Lázaro

Throughout the writing of this dissertation I have received a great deal of support and assistance. I would first like to thank my supervisor, Alberto Portioli, and my co-supervisor, Fabiana Dafne Cifone, whose expertise was invaluable in the formulating of the research topic and methodology in particular. It would certainly have not been the same outcome without them. In addition, I would like to thank AlzaRating ®, for opening their door to us and let us learn, apply and improve.

I would like to express my deep gratitude to my friend, colleague and co-author of this thesis, Simone. You have been my closest friend in my journey as international student in Italy. Thank you for helping me battle the struggles of a foreign student that at starters had no knowledge of the language, let alone the entire system. Thanks for hearing me, helping me and being my friend. I want, can and will call you always my brother.

I would like to acknowledge Davide Pacilio, Maria Alejandra Drombo, Federico Sgoifo and Belén López, my colleagues and friends from my master's at Politecnico, for their wonderful collaboration and friendship. You supported me greatly and were always willing to help me, hear me. I would particularly like to single out my dearest friends Oriol Petit and Ignacio Vega, as they were the ones who stood beside me throughout the whole process, and people which timeless thoughts and ways of seeing life I will always cherish and carry with me. Always push for the best, and never settle for less.

I would like to recognize Paola Coba, the person that since the day I met I knew would become a pillar in my life. Thanks for helping me go always forward and for offering me your support and comprehension in an unconditional and permanent way. Your relentless search for perfection has undoubtedly and greatly inspired me. I cannot express how thankful I am to my best friend and girlfriend.

Finally, I would like to fondly and deeply thank my family: Isabella, Daniela, my grandmother Ena, my mother Karen and my father Jorge. Their objective guidance and relentless support were indispensable in doing or achieving anything. They were always the ones cheering for every project, uplifting any risky decision, and the ones telling me to do the right thing. You provided me with the tools that I needed to choose the right direction and successfully complete my dissertation, my masters overseas, my career. Thank you.

Acknowledgements

Simone Pagani

During the composition of this thesis, I received assistance and support from several people. I would first like to thank all the people involved in this project, my supervisor, Alberto Portioli, and my co-supervisor, Fabiana Dafne Cifone, whose knowledge was of extreme importance in the development of the research. Furtherly, I would like to thank AlzaRating ® and its team for opening their door to us and let us learn, apply and improve.

I would like to thank my colleague, co-author, and most important, my friend, Jorge. You gave me the chance to know a culture and habits far from mine. You have always been there, when needed, to give me an advice, to hear me or for a laugh. Thank you, my brother.

I would like to thank all my Politecnico colleagues and friends, from the first one I knew during my first university day to the latest one. It would have not been the same without you.

Finally, I would like to deeply thank my family: my siblings Marco and Giulia, my grandmothers Argentina and Anna, my mother Patrizia and my father Gianni. You have been by my side from day zero, always willing to hear, help and advice. You gave me the opportunity to begin this journey and I will be forever grateful. At last, I would like to thank my grandfather Fedele, who has always believed in me. Even if you will not read these lines, I would like to let you know that you have been a guidance and a landmark. I would not be where I am without you all. Thank you.

Executive Summary

Short description of the Company

The "AlzaRating Method" is a scientific method that helps improving the financial rating of a company with assured results. The method is property of the company Fuel by Davide Spitale. AlzaRating by Fuel is a consulting company for small and medium enterprises in Italy. The company, as for the moment, offers several products and services to increase the client's rating.

Problem and starting situation

The problem resides in the fact that the company is currently unavailable to provide a desired "Patente 4.0" Lean Rating, meaning a considerable opportunity loss in the Italian Small and Mediums Enterprises market, as for today there are no means of lean assessment targeting that niche. The previous team from Politecnico had developed an instrument to achieve this goal, but it presented 2 main problems:

1. The result is **unreliable** (instrument does not consider quality and quantity of data coming from the company under study)
2. The instrument is **not usable** (only usable for those who programmed it)

Set the target

The team holds as main target the following:

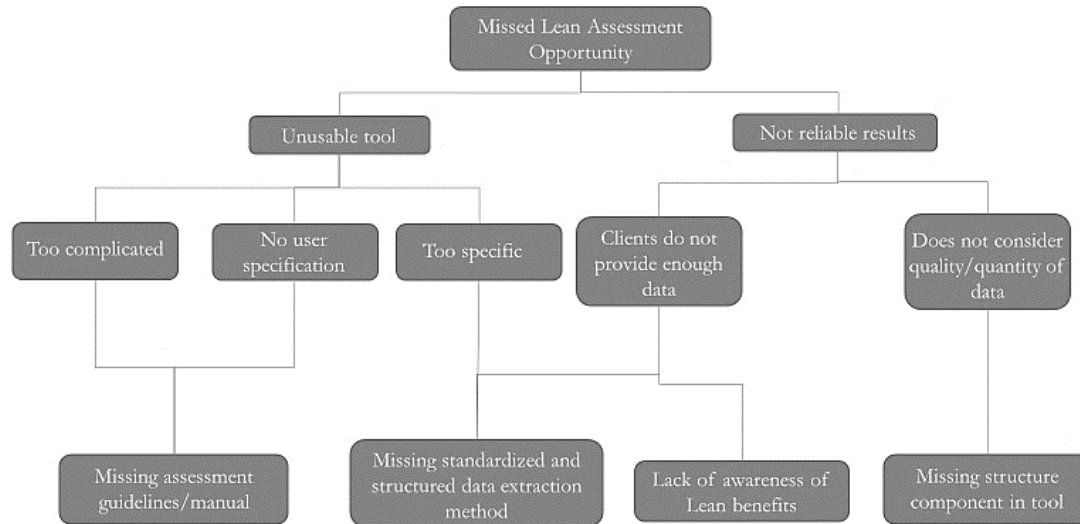
Creation and consolidation of Patente 4.0 Lean Rating

As the establishment and solidification of the Patente 4.0 depends directly on its reliability and usability, the team divided the target in two categories:

- **Must Have:** *Creation of a Structure Assessment Tool (S.A.T.) for Italian SMEs*, with its own *Data Extraction Method (Questionnaire)*, in order to estimate 2 categories of companies: Those that reach a minimum threshold of structure level and those that do not. The first group will have their Lean level assessed, and the second group will be counseled and guided on how to properly structure their operations.
- **Nice to Have:** *Creation of a Lean Assessment Tool (L.A.T.) for Italian SMEs*, with its own *Data Extraction Method and Manual*, in order to provide a reliable and standardized certification (Patente 4.0).

Root causes analysis

As it was stated previously, the main issue is the absence of the Patente 4.0, which was decomposed in two main subproblems: the tool's unreliability and its unusability. After decomposing the problem, and in order to find the root causes lying behind the foreseeable problems, the team developed two different Fishbone Analyses in order to better understand the reasons behind the inability of the company to assess the lean level in clients' operations. From the Fishbone Analysis, a final summing-up tree was created in order to better identify the underlying root causes:



Countermeasures and Implementation

The following table sums up the procedure carried out in order to properly attack each one of the root causes of the problem:

	Root Cause of the problem found	Countermeasure
1	Missing standardized and structured data extraction method	Questionnaire for Structure Assessment Tool (S.A.T.)
2	Missing Structure-Assessment component in tool	Structure Assessment Tool (S.A.T.)
3	Missing assessment guidelines/manual	Lean Assessment Tool (L.A.T) and User's Manual
4	Lack of awareness of Lean benefits	The solution of the problem is out of the scope of the project

The implementation of the countermeasures to be addressed in the thesis are those of the Structure Assessment Tool, its User's Guide with Standardized data extraction

method (which is the Questionnaire), and the Lean Assessment Tool, which has its own User's Manual. The questionnaire gathers the needed data in a standardized way through a set of direct and specific questions. The Structure Assessment Tool (S.A.T.) receives the data coming from the questionnaire as input, and gives a rating measuring the structure level as output. This rating will be used firsthand either to identify those companies ready to have their Lean thinking level assessed, and to exhibit and reveal those companies that need counseling toward structuring and measuring their operations.

The Lean Assessment Tool (L.A.T.) will provide a Lean Thinking rating to those companies that reached the previously set threshold while being studied in the S.A.T. phase. The L.A.T. is accompanied with a thorough and step-by-step guide for the user (User's Manual), as well as guidance on how to read results thrown out by the software.

Monitoring Results

The team developed two different standardized ways to gather data from companies:

- The first one completely created by the team.
- The second one was created following a manual/guide (BizCheck) the company already used.

Testing the second method the team found out two main problems:

- Non-uniformity between the BizCheck used to draft the second type questionnaire and the BizCheck used by the company to gather data from client companies.
- Incompleteness of the available BizCheck (missing data).

The first company under study achieved the following results:

1. Percentage of Measured Factors: 48,5%
2. Percentage of potential computable Lean Indicators: 41%

It meant that the company was not ready for the Lean Thinking assessment since it does not meet the required thresholds.

Suggestions:

- To the client-company: directions on its weak points (where they should improve).
- To AlzaRating: use a standardized version of the BizCheck filling all its parts.

Afterwards, the team was able to apply the first method of data extraction (interview), and the company was able to reach the thresholds. The interview gives much more insight and reliable data.

Consequences of the project

The reach of the project is that of clearing the way toward a reliable and scalable "Patente 4.0". The consolidation of a first instrument, the S.A.T. (Structure Assessment Tool) with its Data Extraction Method and User's Guide (Questionnaire), will provide two main advantages or business options:

1. Identify client's companies whose processes are not structured, measured or controlled enough, in order to help them arrive to the minimum threshold rating and build up from there toward the Lean Thinking culture, hence the Lean Thinking Assessment.
2. Give a mean of comprehension regarding the plausible results obtainable from the L.A.T. (Lean Assessment Tool).

While the construction of the Lean Assessment Tool (L.A.T.) will provide Alzarating the possibility to:

1. Give a Lean Thinking direction rating to those companies that reached the threshold set previously in the S.A.T.
2. Exploit the possibility to segment levels of guidance and counseling for said companies.
3. Strongly base and support all the activities to be carried out with the L.A.T. on the User's Manual.

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Theoretical Framework

In order to thoroughly develop the present project in the best of ways, the team gathered, read, and analyzed a set of selected scientific articles backing up and supporting the underlying theoretical background for the construction of a tool for classifying, rating and patenting small and medium companies in the Italian sector.

Nowadays, the Lean Thinking approach is of extreme importance to diverse industries, in order to run their operations and better their quality. However, some critical factors are needed in order to achieve success. First, the company needs to possess a solid organizational base, where all members of the system are committed to the vision and mission of the company, from foot soldiers to top executives. Second, the leadership component could not be absent, as this one sets the direction of the company. Third, the tools the company may use to improve the client's response. It is widely known and proven that if one of the listed factors is missing, the company faces a high probability of failure (A. Sianesi; "Gestione dei Sistemi di Produzione; 2011).

The finality of the Lean Manufacturing is based on the elimination of the 7 kind of waste, that according to Toyota (Liker & Jeffrey, 2008), are: overproduction, over stock, defective product, movement, over processing, wait and transfer. These factors can and will reduce company's efficiency overtime. A clear example may be the payment of larger warehouses due to overproduction, coming from a bad demand forecast. The heart of Lean Thinking is found on the members of a motivated, flexible and continually problem-solving team. Lean means doing more with less (Liker & Jeffrey, 2008).

Lean Manufacturing concepts found, as all philosophies have, a counterpart that searches to provide the same benefits (or achieve same objectives) but with entirely different means. Six Sigma, which in fact was inspired by Lean, presented 3 main differences:

Six Sigma approach was statistical (scientific and complex), while Lean relies on visuality and simplicity. Lean (Continuous Improvement) goes after culture change inside the organization. Six Sigma focuses on changing given variables that can or cannot be correlated between themselves. Lean is more inclusive, democratic, including every member of the organization. Six Sigma focuses on top talent, held accountable for the success or failure of a project.

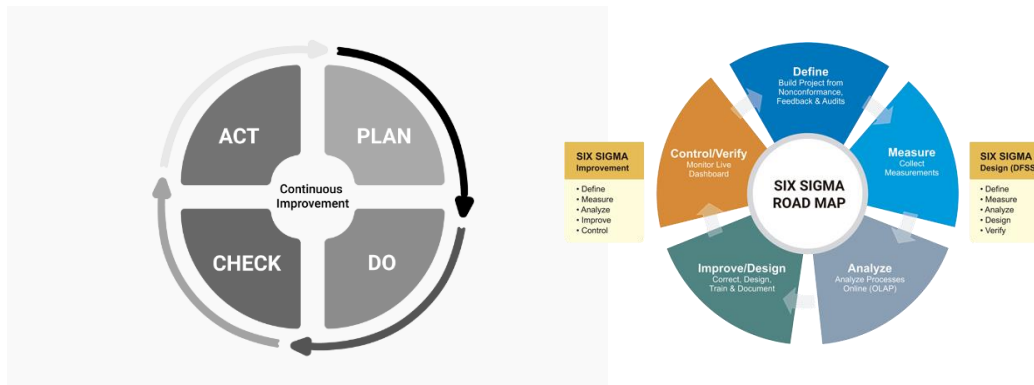


Figure 1 - Continuous Improvement vs Six Sigma

The first steps taken toward a better understanding of the Lean thinking, were those of extensive readings regarding the relationship between Lean operations and Industry 4.0. Books as that of Liker and Jeffrey, “Toyota Way per la Lean Leadership”, gave the team a clear insight on how the Japanese company did to successfully implement the Lean Principles on all their operations. This kind of references helped the team to furtherly decompose Lean Thinking into 4 main perspectives:

- Lean Production
- Lean Supply Chain
- Lean Product Development
- Lean Sales and Marketing

Regarding **Lean Production**, the team based its findings in the book “Gestione dei Sistemi di Produzione”, by Andrea Sianesi. This scientific reference provided a very important amount of needed information regarding the analysis of performance and its measurement in companies, as well as helping in the selection of key indicators needed to establish an evaluation method.

For **Lean Supply Chain**, the research was widely based on documents such as “Lean Supply Chain Management” by Milan Kovac, in which the author states the main differences between the old school or fashion of supply chain and the modern one, or Lean Supply Chain. It is important to state that all surrounding theories and background information regarding Lean applications on supply chain management were of extreme relevance at the time of constructing the tool.

For **Lean Product Development**, the main document used as reference was a very specific scientific article authored by Matt, Dallasega and Rauch, called “Critical Factors for Introducing Lean Product Development to Small and Medium sized Enterprises in Italy”. The article clearly states that there is little research regarding applications of Lean concepts inside Research and Development departments of small and medium enterprises. The paper thoroughly surveys a considerable number of indicators put to test related to their relative importance for a whole spectrum of different SMEs, from industries of all kinds, in Italy.

For the **Lean Sales and Marketing** field, there were not as many sources, references and scientific articles to be based on and go further with the work. As it has happened with knowledge in different fields throughout history, what has been proven to work in certain work or study fields may also be useful in different ones. Making analogies with what has been gathered and understood from Production theories and concepts, ideas of efficiency, productivity, and reach can be extrapolated to measure similar yields in the field of customer attraction, lifetime management and retention.

Lean Production

Lean production is a methodology that focuses on minimizing losses inside manufacturing systems and at the same time maximizing productivity. It comes from the English term “Lean”, that means with no extras. This would mean that with lean production companies pretend to eliminate everything that represents what is not necessary inside our production process (Liker & Jeffrey, 2008).

Toyota attracted interests from several important academic players such as MIT given their drastic improvements in productivity with respect to Ford. Said improvement in productivity was due to the difference in production management.

Lean Production Indicators, coming from previously mentioned scientific articles and books, can be categorized in 7 competitive factors:

Productivity

Measure of the output in terms of input, that could be resources, manpower or even time and money.

1. Labor Productivity

Definition: How many unproductive hours the company pays.

Lean Direction: + (The more the better)

Formula:

$$\frac{\text{Good production in standard time (h)}}{\text{Paid hours (h)}}$$

Factors:

- Good production: Final output of the production process, it is the volume of products ready to be sold. The one quality accepted.
- Standard time: It is the time required to perform a given task by an average skilled operator working at a normal pace using a prescribed method.
- Paid hours: Total hours paid by the company to its employees.

2. Machinery Productivity

Definition: How many hours the plant is opened but it is not producing.

Lean Direction: + (The more the better)

Formula:

$$\frac{\textit{Good Production in standard time (h)}}{\textit{Plant opening time (h)}}$$

Factors:

- Good production: Final output of the production process, it is the volume of products ready to be sold. The one quality accepted.
- Standard time: It is the time required to perform a given task by an average skilled operator working at a normal pace using a prescribed method.
- Plant Opening Time: Time the plant is open, ready to work.

3. Raw Material Productivity

Definition: How much good is the production process considering the raw material required and the raw material used.

Lean Direction: + (The more the better)

Formula:

$$\frac{\textit{RM needed (€)}}{\textit{RM used (€)}}$$

Factors:

- Raw material Required: -
- Raw Material used: -

4. Yield

Definition: "How" the resource works when used.

Lean Direction: + (The more the better)

Formula:

$$\frac{\textit{Volume produced in standard hours (h)}}{\textit{Production effective hours (h)}}$$

- Good production: Final output of the production process, it is the volume of products ready to be sold. The one quality accepted.
- Bad Production: Output that does not meet quality requirements
- Standard time: Time required to perform a given task by an average skilled operator working at a normal pace using a prescribed method

5. Utilization

Definition: "How much" is a given resource used.

Lean Direction: + (The more the better)

Formula:

$$\frac{\textit{Production effective hours (h)}}{\textit{Plant opening time (h)}}$$

Factors:

- Good Production: Final output of the production process, it is the volume of products ready to be sold. The one quality accepted.
- Bard Production: Output that does not meet quality requirements.
- Standard Time: It is the time required to perform a given task by an average skilled operator working at a normal pace using a prescribed method.
- Plant Opening Time: Time the plant is open, ready to work.

6. Overall Productivity

Definition: Hours used for good quality production.

Lean Direction: + (The more the better)

Formula:

$$\frac{\text{Volume produced in standard hours (h)}}{\text{Plant opening time (h)}}$$

Factors:

- Good Production: Final output of the production process, it is the volume of products ready to be sold. The one quality accepted.
- Bard Production: Output that does not meet quality requirements.
- Standard Time: It is the time required to perform a given task by an average skilled operator working at a normal pace using a prescribed method.
- Plant Opening Time: Time the plant is open, ready to work.

Efficiency

1. Down time

Definition: Total failure hours per month.

Lean Direction: - (The less the better)

2. Lack of Materials

Definition: Total hours in which the production was stopped due to lack of materials.

Lean Direction: - (The less the better)

3. Lack of Orders

Definition: Total hours in which the production was stopped due to lack of orders.

Lean Direction: - (The less the better)

4. Set Up

Definition: Total set up hours per month.

Lean Direction: - (The less the better)

5. Maintenance

Definition: Total planned maintenance hours per month.

Lean Direction: - (The less the better)

6. Sample

Definition: Total sampling activity hours per month.

Lean Direction: - (The less the better)

Flexibility

1. Overall Lead time

Definition: Average lead time to complete an order. It is an arithmetical average.

Lean Direction: - (The less the better)

Formula:

$$\frac{\sum \text{Delivered date} - \text{Date of order}}{\text{Number of orders}}$$

Factors:

- Order Delivery: When the orders have been delivered.
- Order is Received: When the orders have been placed.
- Number of Orders: Total number of orders dealt by the company in a given period.

2. Recovery Time

Definition: Average lead time to process an order in stock out.

Lean Direction: - (The less the better)

Formula:

$$\frac{\sum \text{Delivery LT of products in stock out}}{\text{Orders affected by stock out}}$$

Factors:

- Order Delivery: When the orders have been delivered.
- Order is Received: When the orders have been placed.
- Orders affected by stock out: Orders that cannot be processed due to stock out.

Time

1. Production Lead Time

Definition: Average production lead time: time required to make a product from its entry in the production process to its exit.

Lean Direction: - (The less the better)

Formula:

$$\frac{\sum \text{End production of the order} - \text{Start of production of the order}}{\text{Number of orders}}$$

Factors:

- Number of orders: Total number of orders dealt by the company in a given period.
- End production of the order: When the product goes out the production process.
- Start production of the order: When the product goes in the production process.

Customer Satisfaction

1. Timeliness

Definition: Percentage of orders delivered on time.

Lean Direction: + (The more the better)

Formula:

$$\frac{\text{Number of orders delivered on time}}{\text{Number of orders delivered}}$$

Factors:

- Order Delivery: When the orders have been delivered.
- Expected Delivery Date: When the orders should arrive according to contract.
- Number of Orders: Total number of orders dealt by the company in a given period.

Quality

1. Good Piece Time

Definition: Volume produced of compliant products in standard hours.

Lean Direction: + (The more the better)

Formula:

$$\text{Good Production } (p) * \text{Standard Time } \left(\frac{h}{p}\right)$$

Factors:

- Good production: Final output of the production process, it is the volume of products ready to be sold. The one quality accepted.
- Standard time: It is the time required to perform a given task by an average skilled operator working at a normal pace using a prescribed method.

2. Not Good piece time

Definition: Volume produced of non-compliant products in standard hours.

Lean Direction: - (The less the better)

Formula:

$$\text{Bad Production } (p) * \text{Standard Time } \left(\frac{h}{p}\right)$$

Factors:

- Bad Production: Output that does not meet quality requirements.
- Standard Time: It is the time required to perform a given task by an average skilled operator working at a normal pace using a prescribed method.

3. % of Returns caused by defective products

Definition: Returned products due to defects present in products.

Lean Direction: - (The less the better)

Formula:

$$\frac{\text{Number of Returns}}{\text{Number of orders}}$$

Factors:

- Number of products sold: -
- Returns: Products sold that for any reason customers return.

Overall Equipment Efficiency

1. Availability

Definition: Percentage of time available to produce.

Lean Direction: + (The more the better)

Formula:

$$\frac{UP\ time}{UP\ time + DOWN\ time}$$

Factors:

- Down time: Each period in which the asset is not able to deliver the service (when it is required to).
- Good production: Final output of the production process, it is the volume of products ready to be sold. The one quality accepted.
- Bad Production: Output that does not meet quality requirements.

2. Performance

Definition: Real speed of production in regards of the theoretical speed of production.

Lean Direction: + (The more the better)

Formula:

$$\frac{\text{Real production speed}}{\text{Theoretical speed}}$$

Factors:

- Real production Speed: Speed of the production process in the reality.
- Theoretical Speed: Speed the production process should have.

3. Quality

Definition: Percentage of good production.

Lean Direction: + (The more the better)

Formula:

$$1 - \text{Scrap Rate}$$

Factors:

- Scrap rate: Bad Production / Good Production + Bad Production

Lean Supply Chain

Lean Supply Chain aims at the continuous improvement of supply chains in manufacturing companies, something of vital importance for the implementation of the Lean Strategy, as the supply chain keeps production alive and the rest of functions depend on its correct functioning (Kovac, 2013).

In order to correctly apply Lean concepts to the supply chain, each and every one of the links of the chain must be revised:

- Procurement: Its revision comprises vendor rating, selection and study.
- Production: Already addressed in Lean Production.
- Warehousing: Study of wastes regarding movements, waits and most of all inventory comprise the main focuses of Lean Supply Chain studies.
- Delivery: Customer satisfaction is pivotal in this link of the chain. Mix of orders and success rates are measured.

Lean Supply Chain Indicators, coming from previously mentioned scientific articles and books, can be categorized in 6 competitive factors:

Asset Management Efficiency

1. Stock Coverage

Definition: How many days can the company keep operating with the available stock.

Lean Direction: - (The less the better)

Formula:

$$\frac{\text{Available Stock}}{\text{Revenues (Volume)}}$$

Factors:

- Available Stock: How many units does the company have as inventory.
- Revenues (Volume): Number of units sold in the time period of study.

2. Average Inventory

Definition: Average Inventory for the month.

Lean Direction: - (The less the better)

Formula:

$$\text{Average Inventory}$$

Factors:

- Average Inventory: Average inventory that a company has for a given time e.g. for a month.

3. Inventory Accuracy

Definition: Measures the accuracy and reliability level of the information about stock warehouses. Should be between 99% and 100%.

Lean Direction: + (The more the better)

Formula:

$$1 - \left(\frac{|Book\ Inventory - Counted\ Inventory|}{Book\ Inventory} \right)$$

Factors:

- Book Inventory: Inventory held in the accountability system.
- Counted Inventory: Inventory counted by warehouse staff.

4. Inventory Turnover

Definition: Ratio showing how many times a company has sold and replaced inventory during a given period.

Lean Direction: + (The more the better)

Formula:

$$\frac{Revenues\ (Volume)}{Average\ Inventory}$$

Factors:

- Revenues (Volume): Number of units sold in the time period of study
- Average Inventory: - -

5. Cash Conversion Cycle

Definition: Days it takes a company to convert its inventory into cash flows (sales).

Lean Direction: - (The less the better)

Formula:

$$\#DaysReceivable + \#DaysInventory - \#DaysPayable$$

Factors:

- Number Days Receivable: Number of days needed to collect receivables.
- Number Days Payable: Number of days needed to pay invoices.
- Number Days Inventory: Number of days needed to turn inventory into cash.

Agility

1. Upside Supply Flexibility

Definition: Days it takes a company to increase its produced quantities by 20%.

Lean Direction: - (The less the better)

Formula:

$$\#Days\ required\ to\ increase\ 20\% \ of\ production$$

2. Supplier's Adaptability

Definition: Volume growth (%) that can be achieved by suppliers within 30 days.

Lean Direction: + (The more the better)

Formula:

$$production\ \% \ augmented\ in\ 30\ days$$

3. Overall risk at value

Definition: Measures and quantifies the level of financial risk within a firm.

Lean Direction: - (The less the better)

Formula:

Used by investment banks to determine ratio of potential losses

Factors:

- VaR: Ask if previously calculated by financial institution.

Reliability

1. Perfect Order Fulfillment

Definition: Measures fraction of orders without delays, wrong shipments, damage on product or accidents.

Lean Direction: + (The more the better)

Formula:

$$(\%Orders\ delivered\ on\ time) * (\%Orders\ complete) \\ * (\%Damage\ free\ orders)$$

Factors:

- Order Delivery: When the orders have been delivered.
- Expected delivery date: When the orders should arrive according to contract.
- Claims: Complaints coming from clients.
- Returns: Products sold that for any reason customers return.

Costs

1. Cost to serve

Definition: Cost for each unit transported, considering cost factors which are allocated to the single unit.

Lean Direction: - (The less the better)

Formula:

$$\frac{Total\ cost\ of\ delivering\ activites}{Total\ orders\ delivered}$$

Factors:

- Cost of Transportation: Cost of transporting one item from one place to another.

Responsiveness

1. Order Fulfillment cycle

Definition: Measures the time it takes from customer order to the receipt of the product or service by the customers.

Lean Direction: - (The less the better)

Formula:

$$Source\ cycle\ time + Production\ cycle\ time \\ + Delivery\ Cycle\ time$$

Factors:

- Order is received: When the orders have been placed.
- Order is processed (Job Order): When the order enters as job order.
- Start production of the order: -
- End production of the order: -
- Order Delivery: When the orders have been delivered.

Continuous Improvement

1. Suggestions to suppliers

Definition: Number of suggestions made to improve supply quality.

Lean Direction: + (The more the better)

Formula:

Suggestions made to suppliers

2. Technical Visits

Definition: Number of technical visits between supplier and company.

Lean Direction: + (The more the better)

Formula:

technical visits between supplier and company

3. Digitalization of data

Definition: Fraction of documents digitalized and interchanged via internet.

Lean Direction: + (The more the better)

Formula:

% documents digitalized (on the electronic system)

4. Average contract length with most important suppliers

Definition: Lean supply indicates longer and stronger relationships with suppliers.

Lean Direction: + (The more the better)

Formula:

Average contract length with most important suppliers

5. Average number of suppliers for Pareto items

Definition: More reliability and trust on partners.

Lean Direction: - (The less the better)

Formula:

of suppliers for most important Items

Lean Sales and Marketing

Lean Manufacturing concepts can and have been applied and extrapolated to other fields in which it is of interest the measurement of yield. It is important to state that it is difficult to apply Lean concepts to customer interactions without being in possession of good tools and a clear methodology. Lean Sales and Marketing, basically, will focus on eliminating wastes in sales and marketing processes (Elias & Harrison, 2015).

Therefore, it is vital to define what is considered waste in said processes, carrying out analogies with lean concepts in production:

- **Defects:** Defects may be considered as interactions with customers with wrong information. Even if it is regarding information with wrong product, unclear needs assessment or incorrectly delivering specifically tailored messages to the client you are communicating with.
- **Overproduction:** More client communication is not always the more the merrier. Anytime there is a re-engagement to the client to gather more information (or correct previously gathered info) is a waste.
- **Waiting:** Effective sales and marketing initiatives operate rapidly and with short timetables. Waiting is considered a waste when it regards responses of internal design or in measuring rates and interactions with customers.
- **Non-utilized Talent:** The Sales and Marketing staff should focus their entire efforts toward serving customers and sustaining simple processes that keep them out of administrative functions and facing clients.
- **Transportation:** Good Customer Relationship Management is needed to eliminate overheads and focus on deals.
- **Inventory:** Quote delivery should have a minimum queue.

Lean Sales and Marketing Indicators can be categorized in 4 competitive factors:

Inbound Marketing

1. Inbound Marketing Attractiveness

Definition: The ability of the company to transform a new lead into a new customer.

Lean Direction: + (The more the better)

Formula:

$$\frac{\text{New leads from digital channel}}{\text{New leads}}$$

Factors:

- **New leads:** How many leads the company is attracting every month.
- **New leads from digital channel:** How many leads the company is attracting every month thanks to its digital channel.

2. Inbound Marketing Effectiveness

Definition: The ability of the company to transform a new lead into a new customer. Each step of the customer process can be considered in order to identify where the majority of the potential customers has been lost.

Lean Direction: + (The more the better)

Main Formula:

$$\frac{\textit{Customer}}{\textit{New leads}}$$

Potential Formulae (it depends by the phases the customers go through):

$$\frac{\textit{Marketing qualified leads}}{\textit{New leads}}$$

$$\frac{\textit{Sales qualified leads}}{\textit{Marketing qualified leads}}$$

$$\frac{\textit{Opportunities}}{\textit{Sales qualified leads}}$$

$$\frac{\textit{Customers}}{\textit{Opportunities}}$$

Factors:

- New leads: How many leads the company is attracting every month.
- Marketing qualified leads: These leads are likely to become future customers. based on criteria such as company size, content consumption and so on. Leads you want to specifically target with your marketing.
- Sales qualified leads: Leads interesting in talking to someone with your sales department.
- Opportunities: Number of leads that engage with your sales team and move down the sales funnel. There is a good chance they will become new customers.
- Customers: Number of new paying customers.

3. Inbound Marketing Revenues

Definition: to what extent the digital channel impacts on the revenues.

Lean Direction: + (The more the better)

Formula:

$$\frac{\textit{Revenues from inbound marketing}}{\textit{Total sales}}$$

Factors:

- Inbound Marketing Revenues: Revenues coming from the digital channel.
- Revenues (€): Revenues of the company in terms of money.

4. Inbound ROMI

Definition: Return on marketing investment.

Lean Direction: + (The more the better)

Formula:

$$\frac{\text{Revenues from Inbound Marketing} - \text{Marketing and Sales Investment}}{\text{Marketing and Sales Investments}}$$

Factors:

- Revenues from Inbound Marketing (€): Revenues of the company in terms of money.
- Marketing & Sales investments: All the expenses for marketing and sales.

Demand

1. Forecast Accuracy

Definition: It measures the ability of the company to plan the production based on the forecasting the company does.

Lean Direction: + (The more the better)

Formula:

$$1 - \frac{|\text{Actual value} - \text{forecasted value}|}{\text{Actual value}}$$

Factors:

- Actual Value of Demand: Real value of demand.
- Forecasted value of Demand: Value forecasted by the company.

2. Market Share

Definition: It highlights if your company is a leader or a follower. Company position compared to its competitors.

Lean Direction: + (The more the better)

Formula:

$$\frac{\text{Revenues (€)}}{\text{Market Sales}}$$

Factors:

- Revenues (Volume): Total sales of the company in terms of volume.
- Demand of the entire market: Demand of the market in terms of volume.

Customer Lifetime Value

1. Customer Profit

Definition: Average profit the company makes per customer.

Lean Direction: + (The more the better)

Formula:

$$\text{Revenues} - \text{Cost in a given time per customer}$$

Factors:

- Revenues per customer: -
- Cost per customer: -

2. Customer Lifetime Value

Definition: Customer value alongside his relationship with the company.

Lean Direction: + (The more the better)

Formula:

$$\text{Margin} \frac{r}{1 + d - r} * \text{Number of purchases}$$

Factors:

- Margin: Unitary price minus unitary cost.
- Retention Rate (r): How good is the company at retaining customers.
- Discount Rate (d): It is used in order to consider money value over time.

3. Customer Acquisition Costs

Definition: Costs a company bears in order to gain new customers.

Lean Direction: - (The less the better)

Formula:

$$\frac{\text{Total costs for acquiring new customers}}{\text{New customers}}$$

Factors:

- Cost of acquiring new customers: How much is the cost for the Company to reach and keep new customers.

4. Retention Rate

Definition: The ability of the Company to make the customers loyal once they first buy.

Lean Direction: + (The more the better)

Formula:

$$1 - \text{Churn Rate}$$

Factors:

- Churn rate: See churn rate.

5. Churn Rate

Definition: The annual percentage rate at which customer stop buying from your company.

Lean Direction: - (The less the better)

Formula:

$$\frac{\text{Customer at the beginning} - \text{Customer at the end}}{\text{Customer at the beginning}}$$

Factors:

- Tracking number of customers: Knowing how many customers there were at the beginning and end.

6. Sustainable Growth

Definition: it is the realistically attainable growth that a company could maintain without running into problems. (Value higher than 1 means the growth is sustainable).

Lean Direction: + (The more the better)

Formula:

$$\frac{CLV}{CAC}$$

Factors:

- CAC: Customer acquisition cost.
- CLV: Customer Lifetime Value.

7. Pareto Analysis

Definition: Identify the most profitable customers. From where the majority of our profit comes.

Lean Direction: + (The more the better)

Formula:

Number of customers for the 80% of the turnover

Factors:

- CLV: Customer Lifetime Value.

8. Average Revenue per Customer

Definition: Average profitability of customers.

Lean Direction: + (The more the better)

Formula:

$$\frac{\textit{Total revenue}}{\textit{Total number of customers}}$$

Factors:

- Revenues (€): Revenues of the Company.
- Number of customers: Tracking number of customers.

9. One-time customers (Early repeat time)

Definition: Customers that the company is not able to retain once they first buy.

Lean Direction: - (The less the better)

Formula:

$$\frac{\textit{Number of customer that bought only one time}}{\textit{Total number of customers}}$$

Factors:

- Tracking number of customers: Knowing who are your customers.

10. Customer Equity

Definition: Value of all the customers of the company.

Lean Direction: + (The more the better)

Formula:

$$\text{Sum of the CLV of each customer}$$

Factors:

- CLV: Customer Lifetime Value.

Customer Satisfaction

1. Customer Satisfaction Index

Definition: To what extent customers are satisfied by products and services of the company.

Lean Direction: + (The more the better)

Formula:

$$\sum \frac{\text{Sum of all scores}}{\text{Number of questions} * \text{Max Value}}$$

Factors:

- Scores: Sum of all the scores given by the customer to the company.
- Number of questions: Number of questions answered by customers.

2. Net Promoter Score

Definition: It identifies to what extent customers will promote your company.

Lean Direction: + (The more the better)

Formula:

$$\frac{\text{Promoters}}{\text{Detractors} + \text{Promoters}}$$

Factors:

- Promoters: A customer that gave positive feedbacks to the company.
- Detractors: A customer that gave negative feedbacks to the company.

3. Communication Feedback

Definition: How much information the company collects from customers.

Lean Direction: + (The more the better)

Formula:

$$\frac{\text{Number of feedbacks received}}{\text{Total number of customers}}$$

Factors:

- Number of feedbacks received: -
- Surveys: Number of surveys sent to customers.

4. Number of complaints/tickets

Definition: How much the company adheres to its duties.

Lean Direction: - (The less the better)

Formula:

$$\frac{\text{Number of claims}}{\text{Number of orders}}$$

Factors:

- Number of orders: -
- Claims: -

Lean Product Development

Lean Product Development can be considered as the usage of principles brought up from Lean to product development, with the main objective of creating entirely new or better products that will have a positive impact in the market (Rauch, Dallasega & Matt, 2016). Lean Product Development goes from the generation of ideas, their brainstorming, final selection and occasional improvement, to their implementation and transition from concept to product detail and reality.

Small and medium companies have not been researched enough from Lean Research Centers, and it calls for a change. Lean concepts usage in said size of companies has been marginalized, meaning that only remains and not core exercises or methodologies have been created nor tested for SMEs.

With the main articles input, it is reasonable to divide the Lean Thinking aspect of Product Development in 6 different competitive factors:

Efficiency and Effectiveness

1. Average Time to Market

Definition: Average time frame between first ideas and actual availability on consumer markets.

Lean Direction: - (The less the better)

Formula:

$$\frac{\text{Total time to market of all PD projects}}{\# \text{ Product Development projects}}$$

Factors:

- Total time to Market: Time frame between first ideas and actual availability on consumer markets.
- Number of PD Projects: -

2. Schedule Adherence Level

Definition: Control measurement of the entire PD process schedule, focusing on reducing waste.

Lean Direction: + (The more the better)

Formula:

$$1 - \left(\frac{\text{Real time used} - \text{Scheduled time}}{\text{Scheduled time}} \right)$$

Factors:

- Real time por PD Projects: Real time necessary to take a product development from its initial idea to the approved prototype.
- Planned time for PD Projects: Planned time that the product development project should take from initial idea to market.

3. Prototypes approved

Definition: Fraction of prototypes approved out of the total prototypes presented

Lean Direction: - (The less the better)

Formula:

$$\frac{\# \textit{Prototypes approved}}{\# \textit{total prototypes}}$$

Factors:

- Number of Prototypes approved: -
- Number of prototypes: -

4. % Services or Products Launched

Definition: Percentual augmentation or reduction of new products/services regarding previous periods.

Lean Direction: + (The more the better)

Formula:

$$\frac{\# \textit{New products} - \# \textit{New products previous period}}{\# \textit{New products or services previous period}}$$

Factors:

- New products launched: -
- Kept products: -

5. Budget Adherence Level

Definition: How accurate is the company at assigning budget for PD projects.

Lean Direction: + (The more the better)

Formula:

$$1 - \left(\frac{|\textit{Actual Budget} - \textit{Budget Assigned}|}{\textit{Budget Assigned}} \right)$$

Factors:

- Actual budget for PD: -
- Budget assigned for PD: -

Customer Interaction

1. Customer Participation

Definition: Number of ideas given by customers.

Lean Direction: + (The more the better)

Formula:

$$\# \textit{ideas given by the customers}$$

2. Customer Integration

Definition: Number of ideas effectively used in the project.

Lean Direction: + (The more the better)

Formula:

$$\frac{\# \text{ customers' ideas entering Product Development}}{\# \text{ ideas given by customers}}$$

Factors:

- Number of ideas given by customers: -
- Number of ideas effectively used by customers: -

3. Customer Satisfaction of New Products

Definition: Level of satisfaction of costumers regarding new products.

Lean Direction: + (The more the better)

Formula:

$$\text{Test results regarding satisfaction of new products}$$

4. Customer Interaction Lead Time

Definition: Time required to recollect and adapt the ideas given by customer to the development test.

Lean Direction: - (The less the better)

Formula:

$$\text{Time required for testing phase}$$

Reliability

1. Lost Time

Definition: Measures the total time lost by unfortunate events or mistakes during the research development phase.

Lean Direction: - (The less the better)

Formula:

$$\text{Total time lost due to unfortunate occurrences during PD projects}$$

2. Average Down Time for Occurrences

Definition: Measures the average time lost by unfortunate events or mistakes during the research development phase.

Lean Direction: - (The less the better)

Formula:

$$\frac{\text{Total time lost}}{\text{Total number of occurrences}}$$

Factors:

- Number of Occurrences: -
- Occurrences lost during PD phases: -

Quality

1. Cost of Failure

Definition: Average expenses produced by unfortunately actions and mistakes at different instances during the research development phase.

Lean Direction: - (The less the better)

Formula:

$$\frac{\textit{Total cost of failures}}{\textit{Number of failures}}$$

Factors:

- Cost of Failures: -
- Number of PD failures: -

Creativity

1. Ideas entering the screening phase (planning)

Definition: Number of ideas entering the screening phase.

Lean Direction: + (The more the better)

Formula:

$$\frac{\textit{Total ideas accepted Screening phase}}{\textit{Total ideas brainstormed}}$$

Factors:

- Ideas entering screening phase: -
- Total ideas brainstormed: -

2. Ideas entering Project Development

Definition: Number of ideas effectively entering the Project Development.

Lean Direction: + (The more the better)

Formula:

$$\frac{\textit{Total ideas entering Project Development}}{\textit{Total ideas Screening phase}}$$

- Ideas entering Project Development phase: -
- Total ideas entering screening phase -

Continuous Improvement

1. Suggestions from employees

Definition: Number of suggestions coming from employees.

Lean Direction: + (The more the better)

Formula:

$$\# \textit{Suggestions coming from employees}$$

2. Savings from Suggestions

Definition: Money saved from suggestions coming from employees.

Lean Direction: + (The more the better)

Formula:

$$\text{\$ saved from employees' suggestions}$$

3. Value of repeated services due to quality problems

Definition: Money lost due to quality problems in service defects.

Lean Direction: - (The less the better)

Formula:

$$\text{\$ lost due to quality problems}$$

4. Employees rotating tasks within the company

Definition: Number of employees rotating tasks within the company,

Lean Direction: + (The more the better)

Formula:

$$\text{\# of employees rotating tasks within the company}$$

5. Employees working in teams

Definition: Percentage of employees working in teams.

Lean Direction: + (The more the better)

Formula:

$$\text{\% of employees working in teams}$$

6. Lean Operations Tools/Methods Applied

Definition: Number of Lean Operation Tools/Methods being applied in the company

Lean Direction: + (The more the better)

Formula:

$$\frac{\text{Number of Lean tools applied}}{\text{Total number of Lean Tools available}}$$

Tools/Methods to be checked:

- Continuous Improvement: Ongoing effort to improve products, services, or processes.
- Heijunka: Leveling the type and quantity of production over a fixed period of time. This enables production to efficiently meet customer demands while avoiding batching and results in minimum inventories, capital costs, manpower, and production lead time through the whole value stream.
- Poka Yoke: A poka-yoke is any mechanism in any process that helps an equipment operator avoid (yokeru) mistakes (poka).
- Just in Time: System that permits arrival of parts exactly when needed, practically eliminating inventory.

- **Product/Process: Standardization** Product standardization refers to the process of maintaining uniformity and consistency among the different iterations of a particular good or service.
- **Value Stream Mapping:** Lean management tool that helps visualize the steps needed to take from product creation to delivering it to the end-customer.
- **Supplier Integration:** Integrated suppliers.
- **Queue Management:** Queue Management is the process of managing and optimizes queues to improve end-user waiting times and teammate productivity.
- **Product Variants Management:** Different systems or arrangements for different products.
- **Concurrent Engineering:** Method of designing and developing products, in which the different stages run simultaneously, rather than consecutively. It decreases product development time and also the time to market, leading to improved productivity and reduced costs.
- **Front Loading:** Distribute or allocate (costs, effort, etc.) unevenly, with the greater proportion at the beginning of the enterprise or process.
- **Rapid Prototyping:** Group of techniques used to quickly fabricate a scale model of a physical part or assembly.
- **Knowledge Transfer:** Transferring knowledge from one part of the organization to another.

The Company: AlzaRating by Fuel

AlzaRating by Fuel is a consulting company for small and medium enterprises in the Italian region. The company, as for the moment, offers several products and services to increase the client's rating. The company operates in the Lombardy region but offers its services throughout all of Italy and abroad.

The company has carefully identified its target market segment, characterizing a client's company avatar as a company with at least 2 of the following criteria:

- More than 8 employees
- More than 2 million euros of yearly revenue
- A founder older than 35 years of age
- No CFO (Chief Finance Officer)
- More than 2 years of foundation
- A rating B

The company wants to extend its reach and focus on providing helpful insights on improving its clients' rating rapidly and effectively.

Problem background

The Company's Process

The process led by the company is structured as follows:

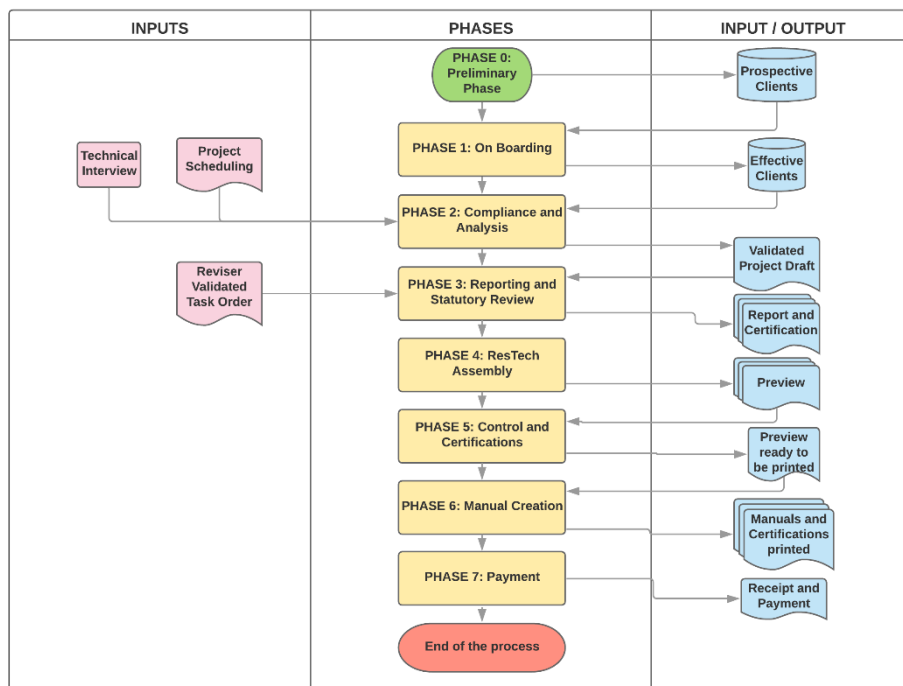


Figure 2 - General Process Map

The process begins with the preliminary phase, in which there is a market research and avatar creation of the target customer, characterized by a marketing campaign and follow up of leads and responses, in order to end up with a pool of prospective customers. On phase 1, dully called onboarding, prospective clients go through prefeasibility and order inspection to determine which are the effective clients that will further go into the phase 2, which is compliance analysis. In this phase, the technical interview and project scheduling activities are carried out, and its output is a validated project draft, that is carefully revised, reported and certificated in phase 3.

Phase 4 is characterized by the assembly of the ResTech (the final document to be delivered to the client company), which in the following steps is controlled, certified and printed. Only 2 copies are printed, one that will remain in the customer's hands and one copy that stands at AlzaRating's offices. Last step of the process concerns payment and invoice charging.

AlzaRating has clearly demonstrated its interest in developing its processes (and those of its clients) hand to hand with state-of-the-art methodologies and knowledge, even to the point of working toward developing a "certificate", a license of themselves, and brand it strong in the market.

The Lean Culture

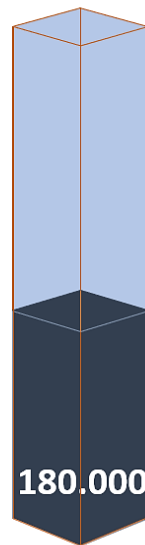
The company is aware that the trends in operations are worldwide directed towards less waste, less environmental impact, less inventory and more effective, clean and profitable production. The more a company can achieve this kind of processes and make it noticeable to customers, suppliers and industry, the better it will perform and withstand the severity of today's competitive market.

The Lean Culture (cultural framework in which the vivid organization, as well as stakeholders, is aware of Lean activities and benefits), also called Lean Thinking, must be supported by Lean Planning, Lean Tools and Lean Concepts, so as the company may profit from the synergies of coordination. Lean Culture awareness, and it is forging, and further application require long term planning and investment, not to mention the high levels of guidance and counseling needed to not fail in the process.

Studies show that as for 2019, a tool that completely or partially measures, guides and rates small and medium enterprises regarding their Lean Thinking level in Italy, does not exist. There is a lack of a rating method of the companies' activities (in terms of the 4 lean perspectives: production, supply chain, product development and marketing), hence there is a giant missed opportunity for anyone who tries to dabble and venture in said market.

Patente 4.0

As it was previously stated, AlzaRating had been working to develop, achieve and solidify a method that could certify and license a company, based on its Lean Thinking level. Regarding the pool of SMEs in Italy, according to ISTAT (Istituto Nazionale di Statistica - the Italian national organ for statistics) there are about 180.000 small and medium sized companies that would fit the requirements of the avatar customer targeted by AlzaRating.



Missed opportunity

Out of all the SMEs in Italy (ISTAT, 2018) the market size that meets the customer characteristics is approximately 180.000

Requisites

>2 million euros yearly revenue,
more than 8 employees,
entrepreneur older than 35 years
old

Top of mind option regarding the objective of the company supported by undeniable opportunity, was the creation of the license, "Patente 4.0", which would be a rating concerning Lean Thinking level in operations of the company (customer) under study, certified by AlzaRating itself. On the subject of what had been developed before the entrance of the present team to the matter, there were some previous and relevant efforts toward the objective unfolded by the preceding group, whom coming also from Politecnico di Milano, had worked on their thesis in AlzaRating's facilities.

1. Previous Efforts

The precursory team, on its pursuit of measuring the Lean level of SMEs in a practical way, constructed an Excel Program that, through the insertion of various (73) KPIs covering the "Production", "Supply chain", "Product Development" and "Marketing" Lean perspectives, rates the company from D to A. Basically, as it makes no sense to request a small or medium company to have excellent indicators in each of the perspectives, what is measured by the tool prototype is the *Kaizen* in company's doings. This means nothing but the *direction*, or *continuous improvement* of each one of the pivotal indicators assessed by the tool. Monthly data of indicators is requested to fill out the format, considering data availability and the direction it should have (either increasing or decreasing) to finally assign a single rating to each indicator.

The differential and crucial point between companies provided by the tool is that it permits the user to modify the relative importance of competitive factors, through an AHP (Analytical Hierarchical Process) matrix of pairwise comparisons. This is an essential component of the engine, as it gives the "tailored and customized" touch that Small and Medium companies need to be correctly assessed.

After the evaluation of indicators presence, direction and relative importance has been carried out, the final Lean Thinking rating is assigned to the company.



Figure 3 - Main Interface of the Tool

2. The Tool's Problems

Ideally, the tool would collect the given data of indicators, measure their variation and direction, assign the single rating to each indicator and calculate the “Patente 4.0” Lean Rating for the company based on the relative importance the company gives to each competitive factor. But in reality, the tool lacks consideration of several key aspects that make the current “Patente 4.0” Lean Rating inexistent:

- A considerable amount of the indicators, as expressed and recorded in the tool, are composed of wrong formulas and definitions, lack of the "lean direction" explanation and the link with lean theory.
- The tool expresses a Lean Rating regardless of the level of structure of the company, meaning that it does not consider the data input provided by the customer.
- The tool has been programmed so that only the programmers may use it with no further delay, as it lacks explanation on its usage.

Breakdown the problem

The problem resides in the fact that the company is currently unavailable to provide the desired “Patente 4.0” Lean Rating for the previously mentioned reasons, that can be more specifically detailed as follows:

1. The result is unreliable

The tool does not consider the quality and quantity of data coming from the company under study, meaning that its result comes regardless of the structure level of the client's company. Currently, the tool could be giving the highest Lean rating to a company that is only providing a small percentage of the requested indicators.

Another issue that takes its toll on the tool's results reliability is the selection, definition and explanation of the indicators being used.

2. The tool is not usable

The tool is currently just usable for those who programmed it, as the layout and dynamics of the software need a walkthrough to obtain a final result. Neither are the users (interviewer and interviewed) profiles defined.

Set the targets

The sequential step was to set some reachable targets based on what was found during the initial analyses carried out with the company tutor. The team holds as main target the following:

- *Creation and consolidation of Patente 4.0 Lean Rating*

As the establishment and solidification of the Patente 4.0 depends directly on its reliability and usability, the team divided the target in two categories:

- **Must Have:** *Creation of a Structure Assessment Tool for Italian SMEs, with its own Data Extraction Method (Questionnaire), in order to estimate which companies have more potential for an appropriate Lean Assessment.*
- **Nice to Have:** *Creation of a Lean Assessment Tool for Italian SMEs, with its own Data Extraction Method and Manual, in order to provide a reliable and standardized certification (Patente 4.0).*

Root cause analysis

Following the aforementioned process, the team must direct its efforts toward the achievement of, at least, the objectives marked as "Must Have". The first step should be the clarification of the underlying reasons and characteristics causing the scarce initial situation. It is then necessary to apply a Root Cause Analysis, which will help the team to solve the problem or defect through identification of its causes and focus on continuous improvement.

As it was stated in the Breakdown of the Problem section, the main issue is the absence of the Patente 4.0, which was decomposed in two main subproblems: the tool's unreliability and its unusability. After decomposing the problem, and in order to find the root causes lying behind the foreseeable problems, the team developed two different Fishbone Analyses in order to better understand the reasons behind the inability of the company to assess the lean level in clients' operations.

Concerning the first problem, the team found that the main reasons are related to data quality coming from clients. Following Ishikawa's original scheme, the team based the cause-effect analysis on 4 main categories, but main problems appeared and were categorized in the People and Methods categories.

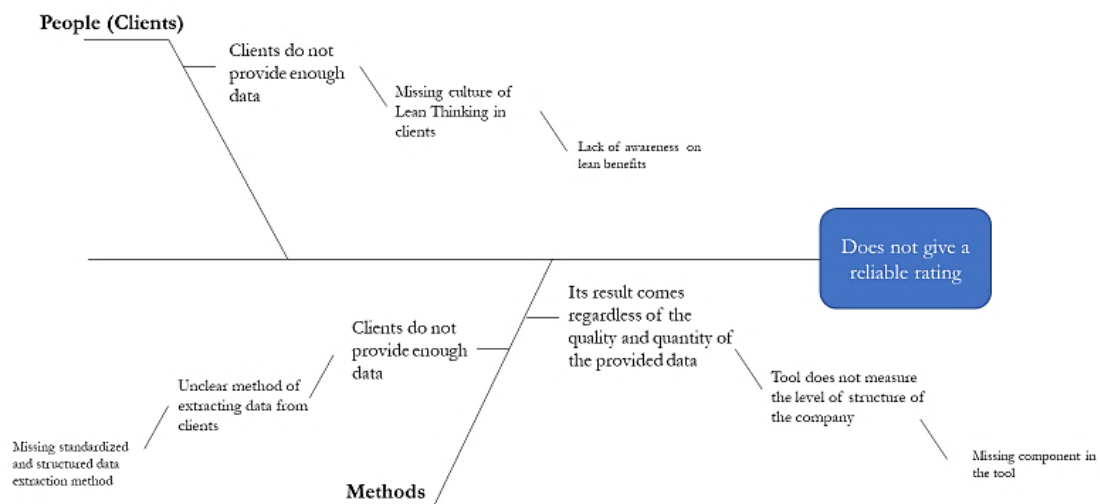


Figure 4 - Ishikawa, Reliability of the Rating

- People:** Most of the times clients do not provide enough data and this can be due either from a client and company perspective. Client-wise, the leading cause lies behind the missing of lean culture and consequently the lack of awareness on lean benefits, therefore there is no motivation or further reasons to collect data and measure indicators toward a Lean Thinking ideal productive situation. Regarding the company perspective, it is deeply related to the Methods branch of root causes.

- **Methods:** The team found that there are 2 main issues to address concerning methodology carried out by the company that boost problems with the tool's reliability. First, clients do not provide enough data mainly due to an unclear method of data extraction, lacking standards and structure. Secondly, the resulting rating comes regardless of the quality (said often poor) of the data, mainly because the tool presents a lack of a component able to measure the structure level of the company in study, that would be a good approach to make a correction of the result given by the instrument.

Regarding the second problem, it is necessary to express the importance of a correction factor. For example, a company with few but good indicators could receive an A or B (high level) rating, even if in reality it was not a lean directed company and having only a few indicators available out of the total number needed to fill the tool completely. On the usability of the tool, the second subproblem, the team divided the found causes in also two branches, one concerning "Methods" and the other concerning "People".

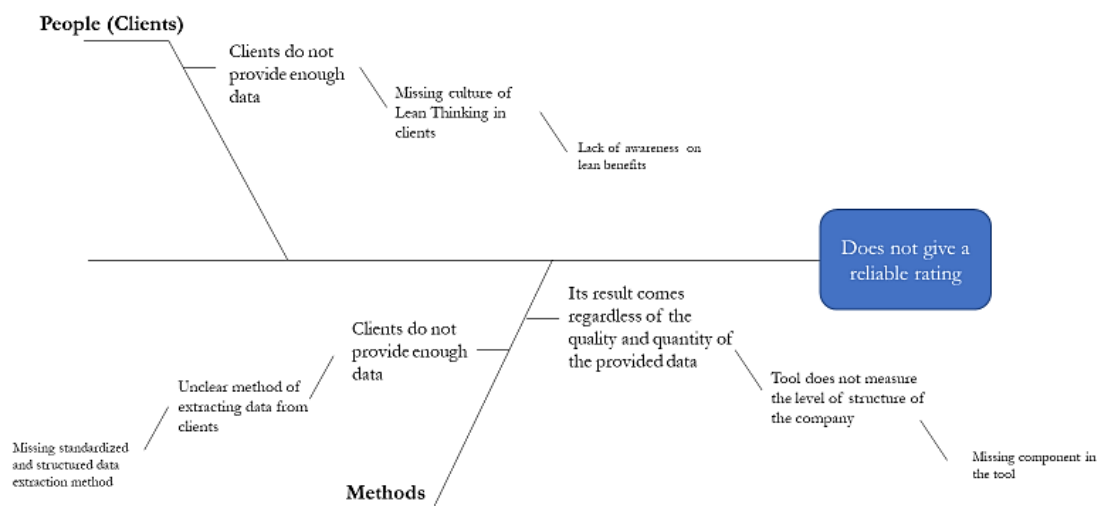


Figure 5 - Ishikawa, Usability of the tool

- **People:** As it holds for people, there are no specifications regarding competencies of the interviewer or interviewed person, given that there is no assessment manual whatsoever. To know the required capabilities of the person to carry out the interview is as important as to know and identify the level of information to which the person that is being interviewed
- **Methods:** The tool lacks a scientific application method. The team has also found that the tool presents two main characteristic issues: it is way too specific and too complicated. The high level of specificity means that the gap regarding the technical level of the interviewer and the interviewed, represented in

vocabulary and access to information, may be of a considerable size, making harder the correct extraction of data. The tool may also be too complicated for the users, as there are no guidelines or step-by-step manual regarding its usage.

Main problems found

Summing up, based on the previous cause-effect analyses, the team can synthesize the main problems that will be addressed by the team in the following tree:

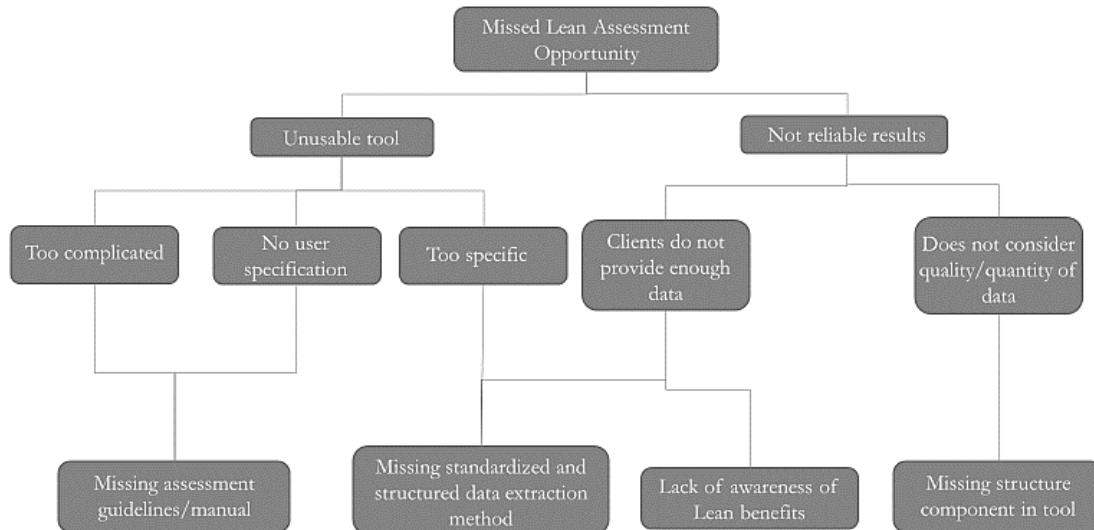


Figure 6 - Root Cause Analysis Sum up

From the previous tree, four main problems are highlighted as those that will head and lead the problem-solving process:

1. Missing standardized and structured data extraction method

The blurry path on the data extraction method leads to imprecisions regarding quality of data gathered from clients.

2. Missing structure-assessment component in tool

A correction factor is needed in order to measure the level of lean in small and medium companies, as for the moment the quality and quantity of the data is not being considered by the tool.

3. Missing assessment guidelines or step by step manual

This problem has a domino effect on the level of difficulty of the tool's usage, regarding the tool itself or the characteristics or requirements needed for the users, which finally affect the usability of the tool.

4. Lack of awareness of Lean benefits

The lack of awareness on lean benefits keeps motivation low in companies for searching Kaizen (continuous improvement)

Countermeasures and Implementation

Problem 1 – Missing standardized and structured data extraction method

Countermeasure: Questionnaire

Data extracting method tailored for Italian small and medium enterprises.

Impact on target

The development of the questionnaire leads to the achievement of one of the must-have attributes.

Implementation of the countermeasure

First of all, it was necessary to define the list of indicators needed to perform the Lean Thinking analysis. As it was stated previously, the team had at its disposal the thesis developed by the previous students in which there was already a list of lean indicators. Through a thorough process, the team had to check, adjust, change and remove and add indicators in order to define a usable final list for the analysis. The detailed list of indicators with their respective lean perspectives, competitive factors, descriptions, lean directions and formulae is presented in the annex of the report.

Once the list was defined, the team broke down each indicator to identify the factors that composed it. The team defined as "factor" the basic element or data of the given indicator, that cannot be furtherly divided. In order to do that, the team graphically exploded each Lean Perspective into their competitive factors (macro areas of indicators):

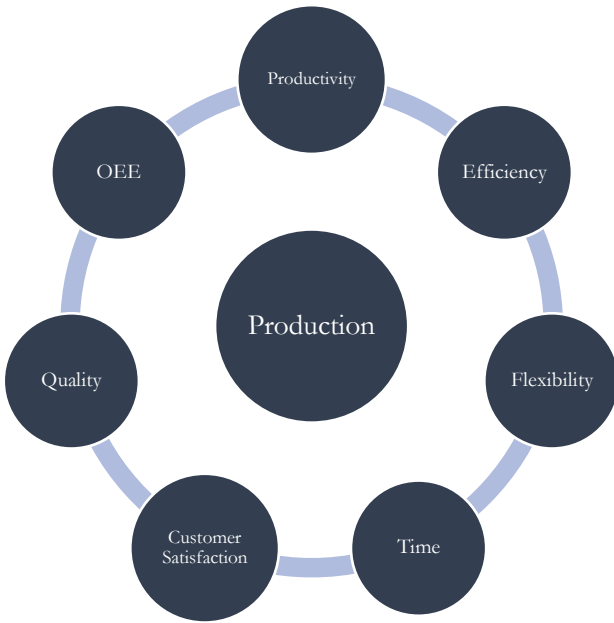


Figure 6 - Production Lean Perspective

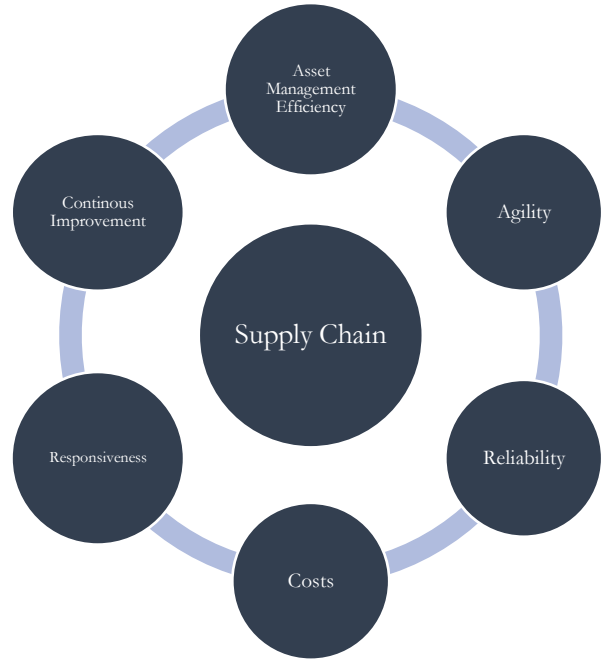


Figure 6 - Supply Chain Lean Perspective



Figure 6 - Sales & Marketing Lean Perspective

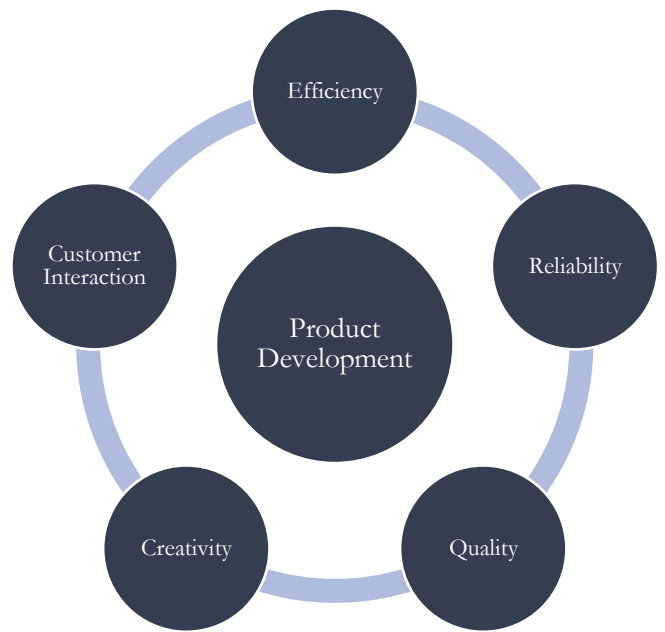


Figure 7 - Product Development Lean Perspective

Once defined the list of factors to be asked to the client companies, a data extracting method was needed. Based on interviews with Italian SME entrepreneurs, the company tutor and the results from the work done by the previous team, it was clear, that to address specific topics in small and medium sized enterprises, a less technical language was requested. The way in which data must be extracted should be a more relaxed, friendly and conversation-kind type of interview.

From brainstorming activities with AlzaRating' owner and employees, the team found out a way to structure the questionnaire, following the building blocks of the business model canvas.

The CEO of the company, Davide Spitale, was very attentive at the time of helping the team out regarding the construction of the questionnaire. To develop an effective one, the interviewer should work as a partner with the client, to enhance the communication strategy. The person carrying out the interview, should keep it simple, with simple questions and expecting therefore instinctual, simpler responses; thus honest ones. Questions should be asked twice, but in different ways in order to avoid bias. Finally, the questionnaire should be developed face to face, to grow confidence among the participants of the interview.

Focusing on the business model canvas' building blocks, the team put all the factors in one out of the nine blocks. To choose where to locate a factor, the team analyzed which were the indicators composing each factor. Each competitive area had a clear direction for the indicators:

1. **Production:** Since Production is seen as a key activity for companies, the majority of factors composing production's indicators will be found in the Key Activity building block.
2. **Supply Chain:** It refers to the supplier processes, the upward side of the supply chain, and many of its indicators can be found in key partners as Lean Thinking requires full integration with the company's most important suppliers.
3. **Sales and Marketing:** Differently from the previously mentioned competitive area, *Sales and Marketing* relates to the downward side of the supply chain, the customers, and the ways in which the company's value is delivered to them. Customer relationships, Channels and Customer segments are the main areas where the related factors are placed.
4. **Product development:** As for production, PD is seen as a key activity and most of its indicators are under the Key Activity building block.

To keep the conversation smooth, fluent and interesting, the entrepreneur (interviewee) must be the center attention. One of the abilities of the interviewer must be the attentive listening, which means that while the interviewee is speaking, she/he must be able to figure out if, from her/his words, the factors required have been tracked.

Furthermore, the interviewer has to direct the interview towards the straight line of the nine building blocks, as they define a logical path to follow in order to touch all the different factors requested. They also help the entrepreneur to tell his/her story in a natural way, while following a useful framework.

All the information coming out from the interview must be collected in the questionnaire, following the user's guide in its first page. Some of the questions requires only a check on YES or NO, while others need the interviewer to write down

the interviewee's answer (at least the key words). Once the interview is over and the questionnaire is filled, it is now the time to transfer all the information onto the Structure Assessment Tool.

The questionnaire is presented as follows, and is on its full extent exposed in the annex section:



Figure 8 - Questionnaire for the Structure Assessment Tool (S.A.T.): Front page and User's Guide

Together with the development of the questionnaire, the team developed another way to extract data from companies. Differently from the first method, which is based on a face to face interview, the other one consists in the analysis of data that the company has already gathered before and for different purposes than that of the “Patente 4.0”. One of the most important AlzaRating activities is the compilation of a Manual/Guide, called BizCheck, which is the starting point for their further analyses. This manual is composed by different parts and presents a lot of questions for different company competitive areas, some of them being extremely useful for our purpose. So, the team fitted the questionnaire and the BizCheck together and extracted the needed information. Anyway, without a face to face interview, the reliability of the structure assessment tool decreases, but thanks to the completeness and wideness of the BizCheck in terms of information request and gathering, the reduction of the tool's reliability is unnoticeable and reasonable.

The result coming from the previously mentioned merger of the questionnaire and the BizCheck tool is presented as follows, but is exposed on its full extent in the annex section:

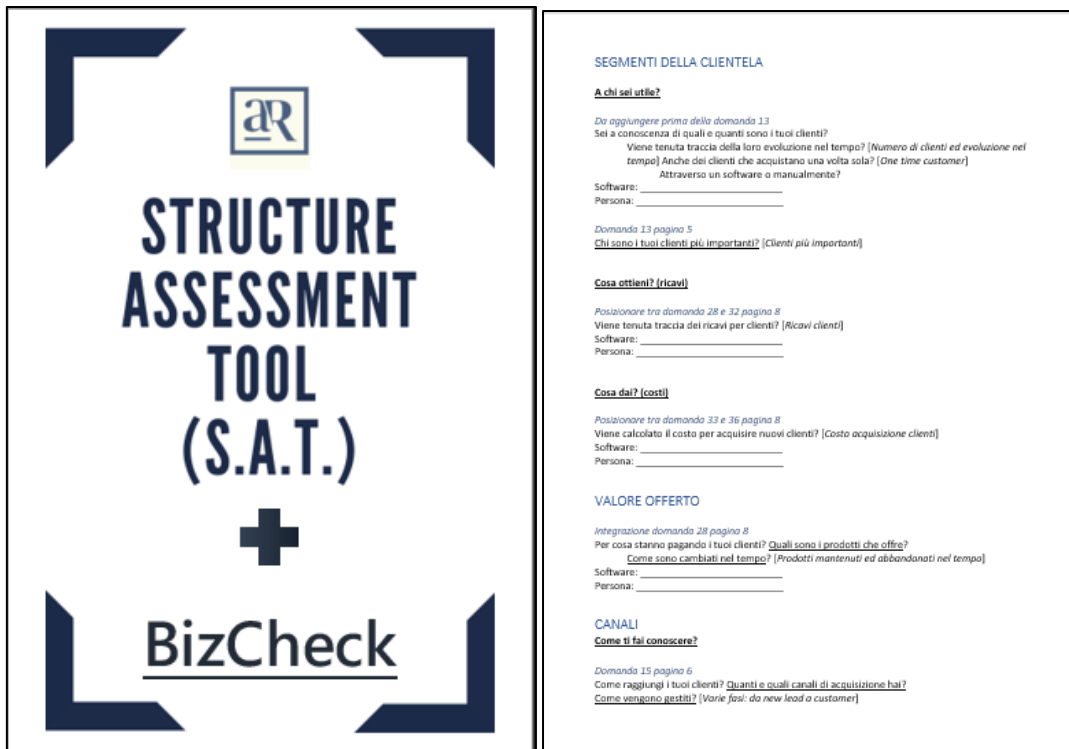


Figure 9 – Second version of Questionnaire: S.A.T. Original Questionnaire + Integration with BizCheck

With the second version of the questionnaire, the team provides AlzaRating a way to interpret the data they have. However, the team thinks the easiest way is, for sure, the first extracting method which was developed for that specific aim and leads to a 100% reliability of data as they do not need interpretation.

Problem 2 – Missing Structure-Assessment component in tool

Countermeasure: Structure Assessment Tool (S.A.T.)

A structure assessment tool able to give a rating based on the structure level of the company under study.

Impact on target

The final object the Company wants to achieve is a certificate (“Patente 4.0”) regarding the Lean level of the client company under study. “Patente 4.0” final aim is to be an acknowledgement for banks, clients and partners of the Company’s efforts towards lean thinking. Based on the aforementioned objective, the target impact of the mentioned countermeasure is the achievement of the must-have attribute.

Implementation of the countermeasure

As it was previously mentioned, the root cause analysis together with the issues faced by the previous group showed and exposed that one of the main reasons for which

the tool is widely considered unreliable, is the lack of enough data. Based on that statement, the team decided to develop a preliminary analysis of the client company. The analysis is made up of the evaluation of the amount of information the client company has.

The algorithm/method behind Patente 4.0 rating is composed by different parts. First of all, an evaluation of the client company’s readiness for a lean thinking assessment is carried out by the Structure assessment tool.

As it was mentioned above, the team found more useful to ask companies about “factors” rather than “indicators”, as the team thinks that unstructured companies can keep track of the performances of resources even if they do not compute the needed indicator for the lean assessment tool. For instance, on one hand if the team asks companies if they are aware and gather data about the churn rate, their response could be negative. On the other side, if companies are asked if they monitor the number of customers they interact with and their evolution over time, the response could be different, maybe not a definitive one, but for sure if they compute the churn rate they keep track of the evolution of customers over time.

Basically, they may have been gathering data for the indicators, but not calculating them. AlzaRating’s objective is to encourage their clients in computing lean indicators. Since as for the moment AlzaRating does not perform a Lean Thinking assessment, what is described below is a procedure the Company must follow in order to implement the countermeasure provided by the team. The tool was developed on Microsoft excel, and to work on it, a little knowledge of it is required. Basically, the tool interface presents itself as shown below:

Factors		1/0	Indicators		1/0	Results
Value Proposition	New products launched Kept products Unitary Price		0 CURRENTLY MEASURED FACTORS, REPRESENTING OUT OF 99	Labour productivity	0	THE MINIMUM THRESHOLD FOR FACTORS (50%) UNFINISHED TEST
Customer Relationship	Number of Ideas given by customers Number of Ideas effectively used by customers Time for testing phase			Machinery productivity	0	
Channels	New leads <i>Sales qualified leads</i> <i>Sales qualified leads</i> <i>Opportunities</i> <i>Customers</i> <i>New leads from digital channel</i>		Raw material productivity	0	THE MINIMUM THRESHOLD FOR LEAN INDICATORS (40%) UNFINISHED TEST	
Customer Segments	Tracking number of customers (end and beginning) Costs of acquiring new customers Revenues per customer One-time customer Number of most imp customers		Yield	0		
	Actual value of Demand Forecasted value of Demand Demand of the entire market		Utilization	0	Follow - Up As none of the minimum thresholds are met, the company should be assisted by AlzaRating toward structure and measurement	
	Number of orders Orders affected by stock out Returns Claims Order is received Order is processed (job order) Start production of the order End production of the order Order delivery Expected delivery date Available stock		Overall productivity	0		
			POTENTIAL COMPUTABLE LEAN INDICATORS, REPRESENTING OUT OF 78	Lack of materials	0	
			0,0%	Lack of orders	0	
				Planned maintenance	0	
				Downtime	0	
				Sampling	0	
				Set Up	0	
				Overall lead time	0	
				Recovery time	0	
				Production lead time	0	
				Timeliness	0	
				Good pieces time	0	
				Not good pieces time	0	
				% returns caused by defective products	0	
				Availability	0	
				Performance	0	
				Quality	0	
				Inbound marketing attractiveness	0	
				Inbound marketing effectiveness	0	
				Inbound marketing revenues	0	
				Inbound FDI	0	
				Customer Profit	0	
				Customer Lifetime Value	0	
				Customer Acquisition Cost	0	
				Retention rate (churn rate)	0	
				Churn rate	0	

Figure 10 - Clean Interface of S.A.T.

As shown above, the user mainly interacts with the list of factors, as all the other parts work automatically once the factors column is filled. The needed data comes from the questionnaire or the BizCheck and the user, for now, must be able to interpret it.

To let the algorithm work, the factors column must be filled only with 1 and 0
- 1 if the factor has been tracked by the client company

- 0 if it has not.

Once all the factors have been filled, the algorithm says whether the threshold of 50% WAS or WAS NOT achieved. The threshold was chosen based on the consideration that, on average with the 50% of factors being measured, the 45% of lean indicators can be calculated. The result is corrected by the percentage of the indicators that can be computed given the available factors as input.

This action is done automatically by the software. Then, once the algorithm has given an outcome, the user must explain the result. The main aim of this tool is to assess which companies have the more potential for a lean thinking assessment. Basically, as the result is a threshold, only those companies able to meet the required values can go forward with the lean assessment tool (L.A.T.).

For those companies that did not reach the required threshold, AlzaRating will provide them with guidelines explaining the importance of the factors that have been asked for the preliminary analysis and suggesting a gathering method. After six months from the first analysis another assessment will be required by AlzaRating, to see if the client improved in the measurement system. If, again, the threshold is not met, further months could be left to the company under study.

As well as for the not suitable companies, guidelines will be provided to suitable companies in order to keep them up to date on the utility on gathering the required data not found in the first analysis for an even more thorough lean thinking assessment. The more data the company has the more reliable the rating.

Problem 3 – Missing assessment guidelines or step by step manual

Countermeasure: New version of the Lean Assessment Tool and its User's Manual

Impact on target: Achievement of a “Nice to have” attribute, thanks to the development of an easy to use, intuitive and integrated Lean Assessment Tool (L.A.T.) together with the creation of a specific User's Manual.

Implementation of the countermeasure:

As it was stated above, the two main reasons, behind the inability of Alzarating to exploit the opportunity given by assessing Italian small and medium sized enterprises, are related to the reliability of the results and the usability of the tool. The first problem was previously and largely addressed by the creation of a pre-analysis tool in order to identify the “most potential” companies with enough data to make the analysis reliable. The second one instead is going to be addressed in this section of the report.

The Structure Assessment Tool and the work behind it, with the creation of the list of factors to be asked to the companies under study, is the first step to begin the rebuild of the existing lean assessment tool.

Once the S.A.T. has given the results, Alzarating knows whether the company has met the thresholds or not. Those companies that have met the required requisites can go ahead with the Lean Thinking analysis. Differently from the first tool, the L.A.T. is based on quantitative data provided by companies. The data extraction is led by the S.A.T. as the results give a picture of what the company holds record of and what the company does not.

Thanks to its experience in a real-life consulting company, the team knows the dynamics and difficulties behind a successful meeting with company owners. Time and its quality represent one of the most important factors when evaluating a meeting. Owners do not have much time to spend and more short meetings are preferred than only a long lasting one. S.A.T. and L.A.T. are unique analyses requiring two different moments and two different meetings, a first one to define the S.A.T. and its component, and a second one to go deeper in the analysis.

1. First meeting: S.A.T. Compilation
 - Average duration: 35 minutes (based on the performed-on field tests)
 - Tools used: first type questionnaire and the S.A.T.
2. Second meeting: L.A.T. Compilation
 - Average duration: to be defined, anyway the team believes it will not be longer than the time required to fill the S.A.T, as the consultant knows what to ask.
 - Tools used: L.A.T.

Once the consultant has gathered the values of the factors, she/he has to insert them into the first interface of the L.A.T. The team suggests inserting them directly on the L.A.T. using the first L.A.T. interface.

Factors		January	February	March	April	May	June	July	August	September	October	November	December
Value propositions	New products launched												
	Kept products Unitary Price												
Customer relationship	Number of ideas given by customers												
	Number of ideas effectively used by customers												
	Time for testing phase												
Channels	New leads												
	<u>Marketing qualified leads</u>												
	<u>Sales qualified leads</u>												
	<u>Opportunities</u>												
	<u>Customers</u>												
Customer segments	<u>New leads from digital channel</u>												
	Tracking number of customers (end and beginning)												
	Customers at the beginning												
	Customers at the end												
	Costs of acquiring new customers												
	Revenues per customer												
One time customer													
Number of most imp customers													

Figure 11 - Factor section L.A.T. Interface

It presents the same list of factors as the one present in the S.A.T interface. The difference is that now the user has to put a value instead of a 1 (the factor has been

recorded) or 0 (the factor has not been recorded). The algorithm requires 12 different values (one for each month) for each factor, but this would not stop the algorithm from working. The consultant can choose the number of data per year based on the information the company provides (by slightly modifying the data input table), the team advises to fill the algorithm with as much data as possible. For example, if the company gathers data quarterly and there are only 4 data per year, the team suggests aggregating more than one year in order to have a more significant trend. Anyway, once chosen the time unit of measure (1 month, 3 months, so on), the algorithm requires all the values for all the units of time. Cells cannot be left empty.

Once the list of indicators is completely filled, the algorithm computes the values of the lean indicators. As the formula used to compute the indicators does not change among the companies, it is possible to benchmark and compare similar companies.

Indicators	January	February	March	April	May	June	July	August	September	October	November	December
PRODUCTION												
Labour productivity												
Machinery productivity												
Raw material productivity												
Yield												
Utilization												
Overall productivity												
Lack of materials												
Lack of orders												
Planned maintenance												
Downtime												
Sampling												
Set Up												
Overall lead time												
Recovery time												
Production lead time												
Timeliness												
Good pieces time												
Not good pieces time												
% returns caused by defective products												
Availability												
Performance												
Quality												

Figure 12 - Indicators Section L.A.T. Interface

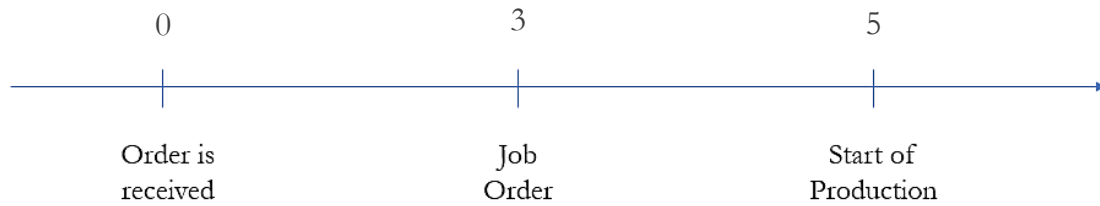
In this section the user must fill only the factors section as the indicators section will be computed automatically.

Anyway, the user is required to pay attention to all the factors and especially to the followings:

- Order is received
- Order is processed (job order)
- Start production of the order
- End production of the order
- Order delivery
- Expected delivery date

As those factors referred to one order only and the algorithm required an average, the team suggests to set “order is received” at 0 (at time 0 the company receives the orders) and then compute an average of the days between the following factors and the time 0 expressed by days spent.

For example: on average between “order is processed” and “order is received” run 3 days and between “start production of the order” and “order is received” run 5 days and so on.



As most of the company records that information in excel sheets, the consultant is required to be able to handle the basics of Excel in order to compute the averages.

In order to perform a customized analysis, the customer has to express his preferences towards the competitive factors of each lean perspective and the lean perspectives themselves (as shown in the figure). The customer must rate each competitive factor from 1 to 10:

- 1: if the competitive factor is not important for them
- 10: if the competitive factor is very important for them

CUSTOMIZATION SECTION	
COMPETITIVE FACTOR (CF)	IMPORTANCE
PRODUCTIVITY	
EFFICIENCY	
FLEXIBILITY	
TIME	
CUSTOMER SATISFACTION	
QUALITY	
OEE	
PRODUCTION LEAN PERSPECTIVE	

Figure 13 - Production Lean Perspective Customization Section

If two different competitive factors have the same rate, it means that for the customer they are equally important. Those values are linked to an AHP model through which the weighs of each competitive factor are computed in order to give a rating. The AHP logic will be furtherly addressed later on. The interface for each lean perspective is presented as shown below:

Figure 14 - Production Lean Perspective Interface

Now on it will be explained the functioning of the algorithm and some advices for the user (Alzarating consultant) will be provided:

Rating definition

Each indicator will be evaluated on two different aspects.

The first one is the direction of the trend (given by the sign of the slope) and the second one is the ratio between the slope and the intercept. Both the parameters are computed with an excel function.

Trend

The trend function highlights the most likely evolution of a variable given its values over time as input. The following equation is used to forecast a possible value in a certain period of time:

$$y = mx + q$$

Where:

m: It is the slope and it defines to what extent the value is changing.

q: It is the intercept of the straight line defined by the values in input.

y: It is the dependent variable, and, in our case, it represents the values of the indicator over time.

x: It is the independent variable, and, in our case, it represents the period of time we are considering. (January is 1; February 2 and so on).

The team only considers the trend as positive or negative.

Slope and Intercept

Differently from the trend function, considering the slope and intercept ratio, it is possible to analyze the evolution of a variable over time quantitatively. The ratio is given dividing the slope and intercept, both of them computed in Excel with their Excel function. Anyway, considering the equation shown above, the first is the m value and the second the q value.

As the result must be the rating of a given company in terms of efforts taken towards Lean Thinking and Continuous Improvement, the threshold, between a company

which is running properly towards that objective and a company which instead is not behaving as it should and could, has been set at 5%.

The team and Alzarating choice of 5% is mainly due to the characteristics of the Italian SMEs, and given that abrupt changes may not occur, the team considered 5% as a midway threshold for changes in the indicator's behavior.

The figure below shows the rating for "Positive" indicators

		Trend Direction	
		Positive +	Negative -
P/I	> 5 %	A	D
	< 5 %	B	C

"A" Rating: Those indicators characterized by a positive direction of the trend with an annual grown higher or equal to 5%.

"B" Rating: Those indicators which follow the direction they should have but which are not growing as they should.

"C" Rating: Those indicators characterized by a trend opposed to the one they should have but with a slow grown.

"D" Rating: Those indicators which are going in the opposite direction at the maximum speed.

		Trend Direction	
		Negative -	Positive +
P/I	> 5 %	A	D
	< 5 %	B	C

The figure above shows the choice of the rating of "Negative" indicators. The reasoning behind is exactly the same of what said for "Positive" indicators. If the indicator is not following the direction it should have, the higher the speed the worst the rating as it is going in the wrong direction and it is getting always worst.

The algorithm computes automatically the rating considering the direction the indicator should have, anyway for each lean indicator is specified the direction.

As it was said above, the algorithm computes a rating for those indicators with all the values per unit of time.

The final company's rating, reflecting the implementation of the Lean Management into the company, considers the rating of all the indicators and the weights set by the customer to the competitive factors and the lean perspectives.

The AHP model

The Analytic Hierarchy Process (AHP) is a theory of measurement through pairwise comparisons and relies on the judgements of experts to derive priority scales. To keep the algorithm as simple as possible, the team developed a user interface easier than the pairwise comparison matrices. The user must insert only the mark the customer gives to each one of the competitive factors and lean perspectives. All the computations are made back-end by the algorithm.

The only alternative the AHP has to analyze is to give a company a rating. To do so, it is only necessary to define priorities among criteria (Production – Supply Chain – Sales & Marketing – Product Development) and sub-criteria (competitive factors of each lean perspective). The team decided not to prioritize the indicators and keep them with equal importance, believing that the division in competitive factor is enough for a completely customized experience for the companies.

The customization section requires the user to insert a value from 1 to 10. Anyway, some advices need to be done. To make the analysis reliable, the team advice to mark the competitive factors consistently, meaning to give the same mark to Competitive Factor of equal importance even if of different lean perspectives.

To carry out the analysis, five different pairwise comparison matrices were built. Four of them for the competitive factors of each one of the lean perspectives and one for the lean perspectives themselves. To be sure the matrices are consistent, each pairwise comparison matrix shows if the matrix is consistent or if it is not.

SALES & MARKETING						
INPUT MATRIX	INBOUND MARKETING	CLV	CUSTOMER SATISFACTION	DEMAND	n	3
INBOUND MARKETING	1	1	1	1		
CLV	1	1	1	1		
CUSTOMER SATISFACTION	1	1	1	1		
DEMAND	1	1	1	1		
TOTALS	4	4	4	4		
NORMALIZED MATRIX	INBOUND MARKETING	CLV	CUSTOMER SATISFACTION		AVE	C.M.
INBOUND MARKETING	0.25	0.25	0.25	0.25	0.25	4
CLV	0.25	0.25	0.25	0.25	0.25	4
CUSTOMER SATISFACTION	0.25	0.25	0.25	0.25	0.25	4
DEMAND	0.25	0.25	0.25	0.25	0.25	4
TOTALS	0.75	0.75	0.75	0.75		
					CI	0.00
					RI	0.90
					CR	0.00
					CONSISTENT	

Figure 15 - Example of AHP

Once the factors and the customization section are correctly inserted, the algorithm gives the company under study a rating on its level towards lean thinking and continuous improvement.

The result is shown in the customer section.

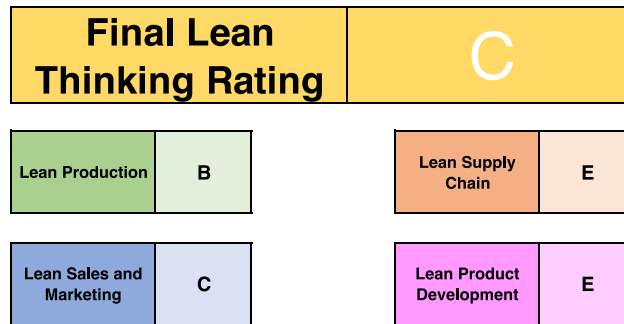


Figure: Customer interface

Cognitive GAP section:

To highlight the improvements made by the company over the years, the team featured the algorithm with a cognitive gap section. This section aims at underlining the performances of the client company. As clearly stated above the lean thinking is a journey that requires continuous efforts along the years. The cognitive gap is given by the evolution of the rating with the passing of time.

Cognitive GAP					
Indicators		Competitive factors		Production	
Year	Year-1	Year	Year-1	Year	Year-1

Figure 16 - Cognitive Gap Section

Three are the possible outputs of the analysis:

- The company rating does not change (B in 2018, B in 2019)
- The company rating increases (B in 2018, A in 2019)
- The company rating decreases (B in 2018, C in 2019)

The analysis is performed with a top-down approach, coming from the final rating, lean perspective ratings, competitive factor ratings and then indicator ratings.

Basically, changes in higher level of the hierarchy mean big changes in the lower levels. Changes in the indicators' ratings and same competitive factor's level mean that the cognitive gap of the company has not changed, as their variations can be related to aleatory variables and not from real changes at the company level.

The competitive factor is the minimum level to define a change in the level of knowledge of the company. The section highlights if the company has increased or decreased its level of knowledge, however the user of the algorithm must be able to identify where and how to analyze the available data of the different years.

Together with the algorithm, the team provides the company with a User's Manual (see the appendix), in which it is explained its functioning and some advices on how to interpret its results. The creation of the manual followed the above dealt topics to let any user be able to use it.

The Lean Assessment Tool represents a unique method to assess Italian Small and Medium Enterprises on their level towards Lean Thinking and Continuous Improvement.

Due to its easy-to-use, the team believes that from the beginning Alzarating will be able to make the most of it, giving its customers a complete experience on the Lean world, being conscious that a healthy future and Lean culture are linked to today and tomorrow's economy.

Problem 4 – Lack of awareness of Lean benefits

The nature of this problem is related to the lack of awareness on lean benefits, keeping motivation low in companies for searching Kaizen (continuous improvement) on their main operations. The solution of the problem is out of the scope of the project.

Monitor Results and Process

Once the tool was standardized and the corrections of the possible results were prepared, the team went on to test the tool on the proposed companies (already clients of AlzaRating).

“Patente 4.0” is the result of a process with different phases and steps to follow. The first step is the collection of qualitative data from the companies under study. Basically, as widely stated above, AlzaRating has two different methods of extracting data: face to face interview with the questionnaire or back-office with the available data (BizCheck).

The first method the team had the opportunity to test was the second one, analyzing the available data the company has.

As soon as the team started looking for data, the first problems arose. The team thought it would have been easy and fast to find and extract data from company documents, but it turned out to be difficult and time-consuming. The causes were mainly due to the fact that:

- The computation of the second version of the questionnaire was based on the latest version of the BizCheck and each factor referred to one or more questions that for ease of use were marked with the number of page and number of the question (refer to annex). While the available BizChecks were an older version of the version the team used to make the second version of the questionnaire. Furthermore, some questions were different or missing. The Company reached the final version, the one the team used, only recently and there were not available data structured as the structure of the second version of the questionnaire.
- Often the BizChecks are incomplete (only some parts are completely filled), so few information could be extracted, making the analysis unreliable and unnecessary.

Whilst the first problem can be addressed, the second one cannot. Anyway, the team found a company to perform the analysis. To tackle the first problem, the team had to analyze all the different questions inside the BizCheck to find the needed information. As the second problem cannot be tackled, the reliability of the result will be lower.

Company # 1 is a company acting in the wood and furniture industry which operates in the B2B market and provides clients with both products and service. The company is located and works in Italy.

The results are shown below:

Factors		1/0	Indicators		1/0	Results
Value Proposition	New products launched Kept products Unitary Price	1 1 1	48 CURRENTLY MEASURED FACTORS, REPRESENTING OUT OF 99:	Labour productivity	1	THE MINIMUM THRESHOLD FOR FACTORS (50%) WAS NOT ACHIEVED
Customer Relationship	Number of ideas given by customers Number of ideas effectively used by customers Time for testing phase	0 0 0		48,5%	Machinery productivity	
Channels	New leads Marketing qualified leads Sales qualified leads Leads available Customers New leads from digital channel	0 0 0 0 0 0	32 POTENTIAL COMPUTABLE LEAN INDICATORS, REPRESENTING OUT OF 78: 41,0%	Flow material productivity	0	THE MINIMUM THRESHOLD FOR LEAN INDICATORS (45%) WAS NOT ACHIEVED
Customer Segments	Tracking number of customers (end and beginning) Costs of acquiring new customers Revenues per customer One time customer Number of most imp. customers	1 0 1 1 1		78	Yield	
	Forecasted value of Demand Demand of the entire market Number of orders Orders affected by stock out Returns Claims	1 1 1 0 0 0		Utilization	0	Follow - Up As one (or none) of the minimum thresholds are not met, the company should be assisted by AlzaRating toward structure and measurement
	Order is received Order is processed (job order) Start production of the order End production of the order Order delivery Expected delivery date Available stock	1 1 1 1 1 1 1		Lack of materials	0	
				Lack of orders	1	
				Planned maintenance	0	
				Downtime	0	
				Sampling	0	
				Set Up	0	
				Overall lead time	1	
				Recovery time	0	
				Production lead time	1	
				Timeliness	1	
				Good pieces time	1	
			Not good pieces time	0		
			% returns caused by defective products	0		
			Availability	0		
			Performance	1		
			Quality	0		
			Inbound marketing attractiveness	0		
			Inbound marketing effectiveness	0		
			Inbound marketing revenues	1		
			Inbound ROI	1		
			Customer Profit	1		
			Customer Lifetime Value	1		
			Customer Acquisition Cost	0		
			Retention rate (churn rate)	1		
			Churn rate	1		

Figure 17 - Results of Company #1 case, using the S.A.T.

Based on the information available, the company under study did not reach the minimum threshold for both factors and indicators. As for the moment the company is not ready for lean thinking assessment as it is not structured enough. Anyway, the team can provide them a path to follow, highlighting the areas in which they lack the most.

For instance, one of the areas is the product development phase where, even if they receive different ideas from customers during the co-creation of customized solutions, they do not keep track of them, losing a lot of potential powerful material that could be used in other projects.

As for AlzaRating, the team believes that the power of the questionnaire and the structure assessment tool can be easily integrated in their processes to give clients a wider customer experience on a today's economy central theme. Together with the results of the S.A.T., AlzaRating can provide companies with materials, papers and seminars to attend on lean thinking and its importance for small and medium sized enterprises, showing how a lean company can perform and the benefits it can gain.

The client company must begin a journey, with AlzaRating always at its side, towards the lean philosophy, a journey that can last from 6 to 12 months where it develops a measurement system for its most important activities. As the Company was close to the required thresholds, 6 months will be enough to improve their ability to record data and information. After 6 months a new analysis will be carried out, to see the improvements of the company under study and if it is ready for a lean thinking assessment.

The team had the opportunity to test the first data extraction method in the first company being analyzed. The results are shown below:

Factors		1/0	Indicators		1/0	Results
Value Proposition	New products launched Kept products Unitary Price	1 1 1	59 CURRENTLY MEASURED FACTORS, REPRESENTING OUT OF 99:	Labour productivity	0	THE MINIMUM THRESHOLD FOR FACTORS (50%) WAS ACHIEVED
Customer Relationship	Number of ideas given by customers Number of ideas effectively used by customers Time for testing phase	1 1 0		Raw material productivity	0	
Channels	New leads Marketing qualified leads Sales qualified leads Opportunities Customers New leads from digital channel	0 0 0 1 1 0	59,6%	Yield	0	THE MINIMUM THRESHOLD FOR LEAN INDICATORS (40%) WAS ACHIEVED
Customer Segments	Tracking number of customers (end and beginning) Costs of acquiring new customers Revenues per customer One time customer Number of most imp customers	1 0 1 1 1	37 POTENTIAL COMPUTABLE LEAN INDICATORS, REPRESENTING OUT OF 78:	Utilization	0	
Key Activities	Actual value of Demand	1	47,4%	Overall productivity	0	Follow - Up As both of the thresholds are met, the company is ready to the Lean Thinking Assessment.
	Forecasted value of Demand	1		Recovery time	0	
	Demand of the entire market	1		Production lead time	1	
	Number of orders	1		Timeliness	1	
	Orders affected by stock out	0		Good pieces time	0	
	Returns	1		Not good pieces time	0	
	Claims	0		% returns caused by defective products	1	
	Order is received	1		Availability	0	
	Order is processed (job order)	1		Performance	0	
	Start production of the order	1		Quality	1	
End production of the order	1	Inbound marketing attractiveness	0			
Order delivery	1	Inbound marketing effectiveness	0			
Expected delivery date	1	Inbound marketing revenues	0			
Available stock	1	Inbound ROMI	0			
				Customer Lifetime Value	1	
				Customer Acquisition Cost	0	
				Retention rate (churn rate)	1	
				Churn rate	1	

Figure 18 - S.A.T. Results of Company #, with first data extraction method

The differences are, as the team had expected, due to the problems stated before. The different version of the Bizcheck, and, mainly, the missing data led to an underestimation of what in reality the company does keep track of. The company, differently from the first test, has reached the required thresholds and is ready for the Lean Thinking analysis. However, the team believes that a complete BizCheck would have led to a very similar result as the one coming from the face to face interview data extraction method.

Hereby the team presents other cases in which the Structure Assessment Tool (S.A.T.) was successfully tested with the first data extraction method:

Factors		1/0	Indicators		1/0	Results
Value Proposition	New products launched Kept products Unitary Price	1 1 1	36 CURRENTLY MEASURED FACTORS, REPRESENTING OUT OF 81:	Labour productivity	0	THE MINIMUM THRESHOLD FOR FACTORS (50%) WAS NOT ACHIEVED
Customer Relationship	Number of ideas given by customers Number of ideas effectively used by customers Time for testing phase	0 0 0		Raw material productivity	0	
Channels	New leads Marketing qualified leads Sales qualified leads Opportunities Customers New leads from digital channel	0 0 0 0 1 0	44,4%	Yield	0	THE MINIMUM THRESHOLD FOR LEAN INDICATORS (40%) WAS NOT ACHIEVED
Customer Segments	Tracking number of customers (end and beginning) Costs of acquiring new customers Revenues per customer One time customer Number of most imp customers	1 0 1 0 1	21 POTENTIAL COMPUTABLE LEAN INDICATORS, REPRESENTING OUT OF 78:	Utilization	0	
Key Activities	Actual value of Demand	1	26,9%	Overall productivity	0	Follow - Up As none of the minimum thresholds are met, the company should be assisted by AlzaRating toward structure and measurement
	Forecasted value of Demand	1		Recovery time	0	
	Demand of the entire market	1		Production lead time	0	
	Number of orders	1		Timeliness	1	
	Orders affected by stock out	0		Good pieces time	0	
	Returns	0		Not good pieces time	0	
	Claims	0		% returns caused by defective products	0	
	Order is received	1		Availability	0	
	Order is processed (job order)	1		Performance	0	
	Start production of the order	1		Quality	0	
End production of the order	1	Inbound marketing attractiveness	0			
Order delivery	1	Inbound marketing effectiveness	0			
Expected delivery date	1	Inbound marketing revenues	0			
Available stock	1	Inbound ROMI	0			
				Customer Lifetime Value	1	
				Customer Acquisition Cost	0	
				Retention rate (churn rate)	1	
				Churn rate	1	

Figure 11 - Results of Company #2 case, using the S.A.T.

This specific company develops its work in innovative technologies for researchers actively working in the field of cell and molecular biology. For what it is visible, they still have not reached the structure threshold, therefore they cannot go in-depth with the Lean Analysis.

Factors		1/0	Indicators		1/0	Results	
Value Proposition	New products launched	1	59	CURRENTLY MEASURED FACTORS, REPRESENTING OUT OF 99.	Labour productivity	1	THE MINIMUM THRESHOLD FOR FACTORS (50%) WAS ACHIEVED
	Kept products	1			Machinery productivity	1	
	Unitary Price	1			Raw material productivity	1	
Customer Relationship	Number of ideas given by customers	1	59,6%	POTENTIAL COMPUTABLE LEAN INDICATORS, REPRESENTING OUT OF 78.	Yield	1	THE MINIMUM THRESHOLD FOR LEAN INDICATORS (40%) WAS ACHIEVED
	Number of ideas effectively used by customers	1			Utilization	1	
	Time for testing phase	0			Overall productivity	1	
Channels	New leads	0	40	51,3%	Lack of materials	0	Follow - Up As both of the thresholds are met, the company is ready for the Lean Thinking Assessment.
	Marketing qualified leads	0			Lack of orders	0	
	Sales qualified leads	0			Planned maintenance	1	
Customer Segments	Opportunities	1	40	51,3%	Downtime	0	THE MINIMUM THRESHOLD FOR LEAN INDICATORS (40%) WAS ACHIEVED
	Customers	1			Set Up	0	
	New leads from digital channel	1			Overall lead time	1	
Key Activities	Tracking number of customers (end and beginning)	1	40	51,3%	Process time	1	THE MINIMUM THRESHOLD FOR LEAN INDICATORS (40%) WAS ACHIEVED
	Costs of acquiring new customers	0			Production lead time	1	
	Revenues per customer	1			Timeliness	1	
Key Activities	One time customer	0	40	51,3%	Good pieces time	1	Follow - Up As both of the thresholds are met, the company is ready for the Lean Thinking Assessment.
	Number of most imp. customers	1			Not good pieces time	1	
	Actual value of Demand	1			% returns caused by defective products	0	
	Forecasted value of Demand	0			Availability	0	
	Demand of the entire market	1			Performance	0	
	Number of orders	1			Quality	1	
	Orders affected by stock out	1			Inbound marketing attractiveness	0	
	Returns	0			Inbound marketing effectiveness	0	
	Claims	0			Inbound marketing revenues	0	
	Order is received	1			Inbound RDM	0	
	Order is processed (job order)	1			Customer Profit	0	
	Start production of the order	1			Customer Lifetime Value	1	
End production of the order	1	Customer Acquisition Cost	0				
Order delivers	1	Retention rate (churn rate)	1				
Expected delivery date	1	Churn rate	1				
Available stock	1						

Figure 12 - Results of Company #3 case, using the S.A.T.

In the third example case, the company in question was able to reach both thresholds. This means said company, that operates in the machine manufacturing industry, is fully able to go further and be assessed regarding their Lean Thinking level. The structure assessment tool, however, shed a light on those spots in which the performance is not still the desired, and marks the gap to be filled by the company with the correct lean guidance.

Conclusions and further steps

Even though that the project had different objectives set at the kick-off meeting, they were dully modified according to the real needs of AlzaRating by the team in the initial stages of the project. These new objectives were about focusing on data quality and quantity, to give a reliable result. The team presented the Structure Assessment Tool (S.A.T.) with its Data Extraction Method (Questionnaire, first and second version). The tool provides a grade from 0 to 100% regarding the level of *lean* structure, meaning how many lean related factors are being measured at the time in the client company.

The S.A.T. was successfully tested in more companies, and it was incorporated in AlzaRating as one of the services they offer. Instead the L.A.T. needs to be tested as soon as possible, anyway thanks to its easy to use and its user manual, the team believes that it will not be difficult for AlzaRating to early implement it. The team remains at AlzaRating disposal to test it.

Even though the project has reached its initial objectives, the ones that follow should be those of the further automation of the tool, uploaded in the company's web servers and with complete interaction and control of intelligent data bases. The team gathered up information and found as base parameters those used for the S.A.T. and L.A.T. but following developments could include even more in-depth studies about performances for each specific competitive factor, inside each Lean Perspective. This would allow for even more sensitive markups, that could predict and better forecast lean performances inside small and medium manufacturing companies.

Bibliography

Milan Kov; “Lean Supply Chain Management” ;(2013)

Giovanni Caruso, Universit degli studi di Bergamo; ”Supply ChainManagement”; (2008)

A. Sianesi; ”Gestione dei sistemi di produzione”;(2011)

Beata Mrugalska, Magdalena K. Wyrwicka; “Towards Lean Production in Industry 4.0”; (2017)

Michela Arnaboldi, Giovanni Azzone, Marco Giorgino;” Performance Measurement and Management for Engineers”; (2014)

Simon Elias & Richard Harrison: Applying Lean in Sales Marketing Moving to Process Thinking (2015).

Erwin Rauch, Patrick Dallasega, Dominik T. Matta: Critical Fac-tors for Introducing Lean Product Development to Small and Medium sized Enterprises in Italy Medium sized Enterprises in Italy (2016).

Rachna Shah, Peter T. Ward; “Defining and developing measures of lean production”; (2007)

David Rowlands, Michael George, John Maxey, Malcolm Upton; “The Lean Six Sigma Pocket Toolbook: A Quick Reference Guide to Nearly100 Tools for Improving Quality and Speed”; (2004)

Gonzalo Perez, Dario Caridi, Assessment Model for the Implementation of Lean Thinking in Italian SMEs; (2018)

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<p>1. Clarify the problem / Problem Background / Current situation</p> <p>Why is the company looking at this problem? Because there is a potential opportunity for Lean Assessment/ opportunities identification, but the company is unable to exploit it at its fullest. What is the problem? There is an opportunity regarding Lean Thinking implementation in SMEs that the company is not exploiting. Who is interested in the problem? AlzaRating Fuel di Davide Spitale and the companies that AlzaRating is dealing with and providing its service. Important for small/medium enterprises. What is the size of the problem? The problem is linked with the inability of the company to exploit an opportunity regarding the implementation of the Lean principles in Italian SMEs. This is measured by the usability of the Lean Assessment tool, which at the moment is very low. What benefit does solving this problem have for the company? There is a cost of opportunity related to the market that the company could be profiting from. Data regarding Italy's quantity of small and medium enterprises. Approximately 180000 companies in Italy that fit the requisits (More than 8 employees and 2 million euro yearly revenue) How does it help to address the goals of the business? Opportunities for Lean projects are unveiled and proposed for tax cutting activities</p>			
<p>2. Breakdown the problem</p> <p><i>There is an opportunity regarding Lean Thinking implementation in SMEs that the company is not exploiting mainly because. As for the moment, the company is unable to provide the Patente 4.0- being this the certificate to be given to the SMEs that attest that the company in question has a specified Lean Thinking level regarding its operations. There is a previously developed tool that for the moment does not meet the required needs, mainly because.. 1) For the moment, it is not able to give a reliable "4.0 Industry" Patent, as it cannot measure first how structured are the companies being assessed. 2) It is usable only for those who programmed it.</i></p>			
<p>"Patente 4.0" inexistent</p> <p>Not reliable results Results are not reliable due to a varied set of reasons. Not able to give the "Patente 4.0"</p> <p>Not usable Only usable for those who programmed it. No further explanations / walkthroughs</p>			
<p>3. Set the Target Must Have: Structure Assessment tool for SMEs - Questionnaire Nice to have (Tesina): LAT - User Manual</p>			
<p>4. Analyse the Root Cause</p>			
<p>5. Develop Countermeasures</p> <p>Countermeasure</p> <ol style="list-style-type: none"> 1 Questionnaire 2 SAI 3 LAT 4 User Manual <p>Impact on target</p> <p>Standardized data extraction method Reliable and corrected structure level assessment</p> <p>Usable Lean Assessment Tool Usable Lean Assessment Tool</p>			
<p>6. Implement Countermeasure</p> <p>Decomposition of Lean Perspectives into Competitive factors, indicators and subfactors composing those indicators. Usage of the Questionnaire + BizCheck to fill the data needed to use the S.A.T.</p>			
<p>7. Monitor Results & Process</p> <p>Application of the Data extraction method (Questionnaire + BizCheck) and further S.A.T. valuation on ICET Studios. Result: Ready for Lean Thinking Assessment</p>			



STRUCTURE ASSESSMENT TOOL (S.A.T.)

IN COLLABORAZIONE CON



POLITECNICO
MILANO 1863

STRUCTURE ASSESSMENT TOOL (S.A.T.)

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Guida all'uso:

Questo tool è stato progettato come supporto e prevalutazione per le aziende alle quali verrà misurato il livello di Lean Thinking. La valutazione del livello di struttura, cioè, il grado in cui le aziende in questione tengono traccia dei fattori studiati, aiuterà a capire quale azienda ad oggi ha abbastanza dati per una valutazione sul Lean Thinking.

L'output del questionario è quello di capire se l'azienda cliente tiene traccia dei fattori che poi saranno necessari per l'analisi Lean. Per questo, al momento, il questionario rappresenta il mezzo per andare a capire se li hanno o meno. La risposta ad ogni domanda può essere Sì o No, Sì se si ha una risposta affermativa (dalla risposta si capisce che sanno di cosa si sta parlando e danno anche qualche esempio quantitativo) No nel caso contrario, oppure una domanda aperta a cui è lasciato all'intervistatore la compilazione con i dati più rilevanti.

Le domande hanno un ordine numerico crescente, alcune domande approfondiscono la domanda sotto la quale sono (per esempio 1.1 approfondisce la domanda 1). Queste domande vanno fatte solo se la domanda "madre" ha una risposta affermativa.

Per l'analisi di estrazione dei dati saranno seguiti i 9 blocchi costituenti la metodologia proposta da Alexander Osterwalder nel 2008 della Business Model Canvas.

Risultati

Una volta compilato il questionario, il trasferimento dei dati al tool per il calcolo di livello di struttura è lasciato all'intervistatore. Al momento l'intervistatore deve "pensare" mentre riempie il tool poiché non c'è una corrispondenza tra le domande e i fattori. Per ogni sezione ci sono scritti i fattori che l'intervistatore sta cercando, per cui è possibile durante l'intervista andare a spuntare quelli che dalla risposta dell'intervistato appaiono essere registrati.

Nota Bene: il questionario S.A.T. deve, oltre che a valutare il livello di struttura di un'azienda, aiutare l'estrazione vera e propria dei dati che avverrà in seguito per la compilazione del L.A.T. (Lean Assessment Tool). Per cui per aiutare l'analisi futura è bene andare a ricercare attraverso le domande dove sarà possibile in futuro andare a trovare quei dati. Per cui domande come "c'è una persona che si occupa di ..." o "c'è un software per la gestione di ..." saranno frequenti. Per queste domande è richiesto da parte dell'intervistatore di segnare i nomi di persone o software o reparti direttamente sul questionario.

Segmenti della clientela

L'evoluzione della clientela nel tempo, andare a capire l'abilità dell'azienda nel trattenere i suoi (più profittevoli) clienti, su che base avviene la scelta dei clienti.

BizCheck generale canvas domande 23-24-25-26

1. A chi l'azienda rivolge la sua offerta? Quali e quanti sono i suoi clienti?

Si	No
----	----

2. Come si sono evoluti nel tempo? Sono sempre gli stessi?

Si	No
----	----

3. L'azienda tiene conto dei clienti che non tornano e le loro motivazioni?

Si	No
----	----

4. Come l'azienda sceglie i suoi clienti? Quali criteri l'azienda usa nello scegliere i clienti?

Si	No
----	----

5. Viene calcolato il costo per acquisire nuovi clienti?

Si	No
----	----

5.1 Come?

6. Vengono divisi i ricavi per cliente?

Si	No
----	----

Fattori ricercati:

- Numero di clienti e loro evoluzione nel tempo
- Clienti più importanti
- Costo acquisizione clienti
- Ricavi clienti

Valore Offerto

In questa sezione del questionario, si vuole capire qual è il business in cui opera l'azienda e i suoi prodotti. Importante è capire se l'azienda ha tenuto traccia dell'evoluzione della sua offerta nel tempo.

1. Seguendo la logica del valore offerto, quali sono i prodotti che vanno a soddisfarlo? (farsi raccontare la storia dell'azienda) *BizCheck 23, 24, 25, 26; Smart Product domanda 82, 83*

Si	No
----	----

2. Come i prodotti si sono evoluti nel tempo per andare a soddisfare il valore offerto? (farsi raccontare la storia dell'azienda)

Si	No
----	----

Fattori ricercati:

- Prodotti mantenuti nel tempo
- Prodotti abbandonati nel tempo

Canali

Come l'azienda comunica/promuove e vende il valore offerto ai clienti
Comunica/Promuove → Inbound marketing: come gestisce i canali inbound.

BizCheck domanda 44 (Prodotto e Mercato)

1. Come riagggiunge l'azienda ai suoi clienti? Quanti e quali canali di acquisizione hai?
BizCheck generale canvas domanda 15

2. L'azienda ha canali digitali attraverso i quali la sua offerta è comunicata? (per esempio sito web) *BizCheck Sales and Marketing domanda 101*

Si	No
----	----

- 2.1 Come gestisce il canale? Ha dei software per monitorare il flusso di visite?

Si	No
----	----

- 2.1.1 Di cosa tengono traccia questi software? *BizCheck Sales and Marketing domanda 102*

Si	No
----	----

- 2.1.2 Come vengono usati questi dati? *BizCheck Sales and Marketing domanda 103* _____

Fattori ricercati:

- Varie fasi: da new lead a customer
- New leads from Digital Channel

Relazione col cliente

Al fine di attuare la filosofia Lean al suo massimo, le relazioni con i clienti rappresentano un tassello importante. Andare ad interagire con loro rappresenta la via per la comprensione di quello che realmente viene percepito e valutato e quindi che rappresenta per loro valore.

BizCheck generale canvas domanda 27

1. Come scegliete con chi creare una relazione? C'è un metodo – procedura?

Si	No
----	----

2. Con quali clienti sono instaurate delle relazioni?

Si	No
----	----

2.1 Come sono gestite le relazioni con questi clienti? In modo attivo o passivo?

Si	No
----	----

2.1.1 I clienti hanno avuto un ruolo nello sviluppo di nuovi prodotti? (idee)

Si	No
----	----

2.1.1.1 Sono state implementate idee provenienti da clienti?

Si	No
----	----

2.1.2 C'è un sistema che monitora le idee date dai clienti?

Si	No
----	----

2.1.2.1 Questo sistema tiene conto dei tempi di interazione con i clienti?

Si	No
----	----

Fattori ricercati:

- Numero di idee date dai clienti (quali sono state effettivamente implementate).
- Quali fasi vengono attraversate prima di diventare cliente.

Risorse chiave

In questa sezione si vuole capire quali sono le risorse che permettono all'azienda il regolare svolgimento delle attività necessarie per fornire al cliente il valore offerto. Inoltre, questa sezione serve per capire quali saranno le attività chiave collegate alle risorse chiave.

1. Quali sono le vostre risorse chiave? _____

1.1 Quali sono le caratteristiche di queste risorse? (Specifiche tecniche/Numero)

- _____
- _____
- _____

BizCheck generale canvas domanda 22

Fattori ricercati:

- Impianto produttivo: specifiche tecniche dell'impianto (Velocità teorica di produzione)
- Dipendenti: numero e qualifiche

Attività chiave

Questa è la sezione più corposa e importante del questionario. In quanto la maggior parte dei fattori richiesti deriva da processi produttivi e logistici che possono essere classificati come attività. Inoltre, verrà anche trattato il processo di miglioramento continuo che è alla base della filosofia Lean.

BizCheck production management domanda 24 (domanda-scorte-ordini)

Previsione della domanda

BizCheck prodotto e mercato domanda 35

BizCheck production management domanda 23

1. Quale è stata la domanda del mercato e la domanda dell'azienda? (viene tenuta traccia negli anni)

Si	No
----	----

2. Viene utilizzato qualche metodo per la previsione della domanda? *BizCheck Supply Chain Management domanda 72*

Si	No
----	----

- 2.1 Quale metodo viene utilizzato? Come ha funzionato negli anni? (vengono analizzati i dati e rielaborato il metodo o è utilizzato solo per una stima generale)

BizCheck Supply Chain Management domanda 73

Si	No
----	----

Fattori ricercati:

- Domanda totale del mercato
- Domanda dell'azienda
- Domanda prevista dall'azienda

Gestione dell'impianto (più in generale del tempo all'interno dell'azienda)

Si vuole capire come l'azienda programma il lavoro durante il corso dell'anno, in particolar modo per andare ad individuare le cause derivante da una gestione non ottimale della stessa. Andare a raggruppare diverse cause di fermo impianto (fermo lavoro) per massimizzare poi il suo utilizzo.

1. Come l'azienda gestisce il tempo nel corso di un anno di lavoro? Quali sono le maggiori cause di stop impianto? Come prevede il tempo in cui si produrrà?

Si	No
----	----

2. All'interno dell'azienda c'è un software che gestisce la gestione di tutti i tempi?
BizCheck Maintenance Management domanda 60, 61, 62

Si	No
----	----

2.1 Chi è la persona che si occupa di gestire il software?

BizCheck Maintenance Management domanda 65

2.2 Che tipo di software è e quanto dettagliato?

2.3 Quali sono i tempi persi che vengono tracciati?

Si	No
----	----

Fattori ricercati:

- Tempo di apertura impianto
- Mancanza materiali
- Mancanza ordini
- Manutenzione programmata
- Guasti
- Campionatura
- Set up
- Produzione scarti

Gestione ordini ricevuti (a valle)

Come l'azienda si approccia nella gestione ordini. È importante identificare nella gestione ordini un processo sequenziale dalla ricezione alla sua consegna. Questo è importante per andare a cercare punti di inefficienza all'interno del processo di miglioramento.

1. Come si approccia l'azienda con la clientela per quanto riguarda gli ordini?

BizCheck posizionamento industria 4.0 domanda 1

2. C'è una persona responsabile della gestione ordini?

BizCheck Supply Chain Management domanda 77

3. Viene usato qualche tipo di software per la gestione ordini?

BizCheck production management domanda 30

4. Vengono tracciate tutte le fasi di un ordine? Dalla sua ricezione alla sua consegna?

Si	No
----	----

4.1 Quali sono le fasi in maniera più specifica?

Si	No
----	----

4.2 Come vengono tracciate le fasi? Vengono segnate attraverso una data o in maniera diversa?

Si	No
----	----

4.2.1 Come vengono utilizzati i dati raccolti? Vengono calcolati qualche indicatori?

Si	No
----	----

5. Come l'azienda affronta gli ordini che presentano stock-out (impossibilità di completare un ordine dovuto alla non disponibilità dei prodotti)?

6. Come viene affrontata la politica dei resi e delle lamentele?

7. C'è una persona ad occuparsene?

7.1 Vengono registrati tutti gli ordini resi o le lamentele riguardanti gli ordini?

Si	No
----	----

7.1.1 C'è un software che registra tutti i dati derivanti da resi e lamentele?

Si	No
----	----

7.1.1.1 Come viene utilizzato? Viene per esempio presa nota dei motivi?

Si	No
----	----

Fattori ricercati:

- Data in cui l'ordine è stato:
 - Ricevuto
 - Promesso di essere consegnato
 - Processato in Job Order
 - Iniziata la sua produzione
 - Finita la sua produzione
 - Consegnato al cliente
- Numero totale di ordini ricevuti
- Numero di ordini in cui si presenta stock-out
- Numero resi
- Numero lamentele

Produzione

L'analisi della produzione permette di comprendere come l'impianto produttivo lavora, quel è la sua efficienza e sottolineare i suoi punti deboli. È molto importante perché le varie tecniche Lean sono state principalmente utilizzate qui.

1. Cosa viene prodotto dall'azienda, cosa viene comprato da terze parti e cosa viene assemblato? (Sostanzialmente capire le linee di produzione e di assemblaggio) *Negli spazi scrivere come vengono fatte le varie cose:*

- Prodotto:

- Comprato:

- Assemblato:

Analisi degli input: Chi gestisce gli ordini a monte e si occupa degli approvvigionamenti

BizCheck production management domanda 26

1. Chi è la persona responsabile degli ordini a monte con i fornitori?

2. Che software viene utilizzato per la gestione degli stessi?

3. C'è una distinta base per ogni prodotto?

Si	No
----	----

BizCheck design engineering domanda 17

Addetti dell'impianto: formazione e prestazioni

BizCheck production management domanda 39

4. Come vengono formati gli addetti dell'impianto? Esiste un corso?

Si	No
----	----

4.1 Cosa viene insegnato? C'è una procedura standard con tempi standard?

Si	No
----	----

5. Nel caso non ci sia un corso esiste comunque una procedura standard con tempi standard, o il tutto è a discrezione dell'operatore? (opzionale)

Si	No
----	----

6. Viene tenuta traccia delle prestazioni degli operatori? (velocità di produzione)

Si	No
----	----

Flussi all'interno dell'impianto: scarti di produzione e sprechi

7. C'è un software e/o una persona che si occupa di tracciare il flusso delle materie prime attraverso l'impianto produttivo?
-

8. Viene tenuta traccia degli sprechi quali scarti di produzione o prodotti finiti non conformi?

Si	No
----	----

- 8.1 È possibile trovare il tutto in un software?

Si	No
----	----

BizCheck production management domanda 31

9. Viene tenuta traccia dei costi derivanti dal non raggiungimento della qualità?

BizCheck Quality Management domanda 46, 48, 50

Si	No
----	----

Prestazioni dell'impianto:

10. Vengono valutate le prestazioni dell'impianto produttivo comparandole con le prestazioni teoriche fornite dalla casa produttrice?

Si	No
----	----

- 10.1 Viene utilizzato qualche software?

Si	No
----	----

10.1.1 Quale? _____

BizCheck production management domanda 36

11. Quanto è flessibile l'impianto produttivo da un punto di vista di saturazione? È previsto un piano per incrementare la produzione nel breve termine? Se sì di quanto?

Si	No
----	----

Se no, quanti giorni sarebbero necessari per aumentare la produzione del 20%?

Fattori ricercati

- Produzione buona
- Produzione scarti
- Standard time
- Materie prime utilizzate e MP necessarie
- Velocità di produzione reale

- Tasso di scarto
- Giorni necessari per incrementare la produzione del 20%
- Costo dovuto a problemi di qualità

Gestione delle scorte

Riguardo alla filosofia Lean, un'analisi della gestione delle scorte è necessaria in quanto una riduzione delle stesse è alla sua base.

1. Come l'azienda gestisce le scorte? Qual è la sua politica?

2. Quale supporto viene utilizzato per la gestione delle scorte (PF-WIP-MP)?

BizCheck production management domanda 32

3. Quanti magazzini/spazi adibiti allo stoccaggio ha?

3.1 Come vengono gestiti?

BizCheck Logistics Management domanda 66

3.2 Chi li gestisce?

4. Sono presenti libri dell'inventario?

Si	No
----	----

4.1 Sono attendibili?

Si	No
----	----

4.2 Come vengono aggiornati? È previsto il conteggio manuale delle scorte per la revisione dei libri? *BizCheck Logistics Management domanda 67*

Si	No
----	----

5. Quante scorte di prodotto finito vengono tenute generalmente? Sempre la stessa quantità (o dipende da periodo a periodo)?

Si	No
----	----

5.1 Come viene scelta questa quantità? _____

5.2 Viene tenuta traccia dell'evoluzione delle scorte nel tempo?

Si	No
----	----

6. Generalmente dopo quanti giorni un debito viene pagato?

7. e un credito riscosso?

BizCheck generale canvas domanda 29

8. L'inventario disponibile mediamente quanto tempo dura?

Fattori ricercati:

- Stock di prodotti finiti disponibile
- Inventario a libro
- Inventario a conteggio (manuale)
- Numero di giorni in cui si pagano i debiti
- Numero di giorni in cui vengono pagati i crediti
- Numero di giorni Inventario

Sviluppo prodotto

BizCheck design engineering domanda 12-13-15-19

1. Come avviene lo sviluppo prodotto all'interno dell'azienda? (selezionare una)
- a) Internamente
 - b) Esternamente
 - c) Entrambi

Se risposta è A o C andare avanti con le domande, se C passare alla prossima sottosezione

2. È possibile definire un processo di sviluppo prodotto, dalla generazione delle idee alla generazione del nuovo prodotto pronto per essere venduto?

Si	No
----	----

3. Chi è la persona responsabile dello sviluppo prodotto?

4. Vengono utilizzati dei software per la registrazione dei dati in input, output e attraverso le fasi di questo processo?

5. Che tipo di dati vengono registrati? (numero di idee, prototipi etc.)

- _____
- _____

• _____

6. Qual è lo scopo della loro registrazione? _____

7. Viene usato lo strumento di brainstorming per la generazione delle idee?

Si	No
----	----

I clienti/fornitori hanno un ruolo attivo nella generazione di idee? *BizCheck Sales and Marketing domanda 104*

Si	No
----	----

8. Vengono tracciate tutte le idee sia quelle scartate da subito, quelle scartate più avanti e quelle effettivamente implementate?

Si	No
----	----

9. Vengono tracciati i tempi del processo di sviluppo prodotto?

Si	No
----	----

9.1 Quali? Di tutte le fasi o solo di alcune?

10. Quali sono le cause di perdita di tempo maggiore nello sviluppo prodotto?

- _____
—
- _____
—
- _____
—

10.1 Vengono registrati questi dati?

Si	No
----	----

11. Come viene allocato il budget per lo sviluppo prodotto?

11.1 È possibile sfiorare questo budget?

Si	No
----	----

12. Viene tenuta traccia dei costi derivanti da sviluppo di prodotti non andati a buon fine?

Si	No
----	----

13. Viene tenuta traccia dei progetti di sviluppo prodotto svolti?

Si	No
----	----

13.1 Viene tenuta traccia dei prototipi approvati?

Si	No
----	----

Fattori ricercati:

- Numero di idee derivanti dal brainstorming
- Numero di idee che entrano la fase di scrematura
- Numero di idee che entrano il progetto di sviluppo prodotto
- Numero di fallimenti
- Budget assegnato per PD e budget reale
- Time to market
- Tempo pianificato per progetti PD e tempo effettivo
- Tempi persi durante le fasi di PD
- Numero di idee raccolte e adattate dei clienti
- Costo di fallimenti nello sviluppo prodotto
- Numero di idee effettivamente implementate
- Numero di progetti sviluppo prodotto
- Prototipi approvati

Miglioramento Continuo

Quali attività, tecniche, strumenti vengono messi in pratica nella ricerca del miglioramento continuo.

1. Cos'è il miglioramento continuo nella tua opinione e come viene implementato nella tua azienda?

Si	No
----	----

2. Quali tecniche di miglioramento continuo vengono implementate?

- _____
- _____
- _____

*Per quanto riguarda implementazione del sistema di qualità in produzione:
BizCheck production management domanda 42*

3. C'è conoscenza dei benefici portati da queste tecniche all'interno dei dipendenti?
BizCheck HR domanda 87, 88, 89

Si	No
----	----

4. Ci sono dipendenti che lavorano in team o hanno ruoli dinamici all'interno dell'azienda?

Si	No
----	----

5. C'è un sistema di comunicazione con il cliente per la valutazione dell'operato dell'azienda?

Si	No
----	----

- 5.1 Come funziona?

5.2 Prevede l'uso di questionari? *BizCheck generale canvas domanda 19*

Si	No
----	----

5.2.1 Come sono strutturati questi questionari?

5.2.2 Chi è la persona responsabile per la raccolta dei feedback?

5.2.3 C'è un sistema per la gestione dei feedback? *BizCheck Quality Management domanda 43*

Si	No
----	----

5.2.4 Vengono interpretati e utilizzati i feedback ricevuti?

Si	No
----	----

Fattori ricercati:

- Numero di visite tecniche
- Percentuale di documenti digitalizzati
- Lunghezza contrattuale media
- Numero di strumenti Lean utilizzati all'interno dell'azienda
- Numero di suggerimenti dai dipendenti e risparmi grazie a questi interventi
- Numero di dipendenti con ruoli rotanti
- Numero di dipendenti che lavorano in team
- Sondaggi

Fornitori chiave

Relazioni a monte nella catena di fornitura. Relazioni ben strutturate ed integrate possono portare a un vantaggio competitivo. Analisi dei partner più importanti per lo sviluppo integrato di una cultura Lean.

1. Quali sono i fornitori/partner con cui l'azienda interagisce? Cosa forniscono? Quali sono strategici?

- _____
- _____
- _____

Dal BizCheck generale canvas domanda 21

2. C'è una persona che si occupa delle relazioni con i fornitori?

3. Viene usato un software per la gestione dei dati in input ed output con i fornitori?

4. Come vengono valutati e scelti i fornitori? *BizCheck Supply Chain Management domanda* 80

4.1. Quali sono i criteri utilizzati?

- _____
- _____
- _____

5. Quel è la risposta media in termine di tempo che i fornitori hanno a richiesta da parte della vostra azienda ad un incremento nella fornitura?

6. Vengono misurate le prestazioni dei fornitori?

Si	No
----	----

6.1. Cosa viene misurato?

7. I fornitori hanno un ruolo attivo nel miglioramento continuo?

Si	No
----	----

7.1. Forniscono suggerimenti?

Si	No
----	----

7.2. Questi suggerimenti sono ascoltati ed implementati dall'azienda? Qualche esempio?

- _____
- _____
- _____

1.1 Viene tenuta traccia di questi suggerimenti?

Si	No
----	----

Fattori ricercati:

- Numero di suggerimenti dai fornitori
- Numero di fornitori per i componenti più importanti
- Incremento di volume raggiungibile dai fornitori in 30 giorni

Struttura dei costi

Sicuramente questa rappresenta una sezione importante ed è volta ad evidenziare i miglioramenti importati da una filosofia Lean nel tempo.

1. Come avviene la gestione dei costi all'interno dell'azienda?
 - Corporate
 - Dipartimenti

2. È possibile disaggregare le voci di costo dei documenti finanziari?

Si	No
----	----

3. Chi è la persona che si occupa del loro tracciamento?

4. Che software viene utilizzato?

Fattori ricercati:

- COGS: costo dei prodotti venduti (conto economico)
- Investimenti in Marketing&Sales
- Costo per l'acquisizione i nuovi clienti
- Costo per il trasporto
- Ore personale pagate (relativo all'impianto produttivo)
- Costo unitario

Flusso di ricavi

1. Quali sono i suoi ricavi? _____
 - 1.1 Come sono suddivisi i ricavi?
 - _____
 - _____
 - _____

 - 1.2 È possibile scorporare i ricavi?

Si	No
----	----

 - 1.3 In quale software vengono archiviati i dati relativi alla contabilità?

2. Chi è la persona responsabile per la gestione della contabilità?

Fattori ricercati:

- Ricavi in € e volume
- Prezzo dei prodotti
- Ricavi da Inbound marketing

Note generali

Capacità produttiva dell'impianto:

BizCheck production management domande 25-27-28-29

Supporti (software) utilizzati per la produzione:

BizCheck production management domande da 28 a 38



**STRUCTURE
ASSESSMENT
TOOL
(S.A.T.)**



BizCheck

SEGMENTI DELLA CLIENTELA

A chi sei utile?

Da aggiungere prima della domanda 13

Viene tenuta traccia della loro evoluzione nel tempo? [*Numero di clienti ed evoluzione nel tempo*] Anche dei clienti che acquistano una volta sola? [*One time customer*]

Attraverso un software o manualmente?

Software: _____

Persona: _____

Domanda 13 pagina 5

[*Clienti più importanti*]

Cosa ottieni? (ricavi)

Posizionare tra domanda 28 e 32 pagina 8

Viene tenuta traccia dei ricavi per clienti? [*Ricavi clienti*]

Software: _____

Persona: _____

Cosa dai? (costi)

Posizionare tra domanda 33 e 36 pagina 8

Viene calcolato il costo per acquisire nuovi clienti? [*Costo acquisizione clienti*]

Software: _____

Persona: _____

VALORE OFFERTO

Integrazione domanda 28 pagina 8

Quali sono i prodotti che offre?

Come sono cambiati nel tempo? [*Prodotti mantenuti ed abbandonati nel tempo*]

Software: _____

Persona: _____

CANALI

Come ti fai conoscere?

Domanda 15 pagina 6

[REDACTED] Quanti e quali canali di acquisizione hai?
Come vengono gestiti? [Varie fasi: da new lead a customer]

Domanda 44 pagina 16

[REDACTED] C'è un canale online?
[New leads dal canale digitale]

Software: _____

Persona: _____

RELAZIONE COL CLIENTE

Domanda Preliminare

Quali fasi si attraversano per diventare cliente?
[Fasi per diventare cliente]

Domanda 27 pagina 7 + integrazione

[REDACTED]
[REDACTED] (accettate idee dai clienti per nuovi prodotti?)
Tenete traccia del numero delle idee date dai clienti? [Numero di idee date dai clienti]

Domanda 104 pagina 53 + Integrazione

[REDACTED]
[REDACTED]
Tracciate il tempo in giorni/mesi con l'interazione dei clienti? [Customer interaction lead time]

Domanda 12 pagina 23

[REDACTED]
Se opzione B o C (c'è co-creazione)

RISORSE CHIAVE

Chi sei e cosa hai?

Domanda 22 pagina 7

[REDACTED] Specifiche tecniche
[Impianto produttivo: velocità teorica di produzione]

ATTIVITÀ CHIAVE

Previsione della domanda

Domanda 35 pagina 15

[REDACTED] [Domanda totale del mercato]

Domanda 23 pagina 27

[REDACTED]

Software: _____

Persona: _____

Domanda 72 pagina 43

[REDACTED] [Domanda prevista dell'azienda]

[Domanda dell'azienda]

Domanda 73 pagina 43

[REDACTED]

Software: _____

Persona: _____

Gestione dell'impianto

Da aggiungere a production management pagina 27

Domanda 54-55-56 pagina 37

[REDACTED] [Manutenzione programmata]

[REDACTED]

[Tempo di apertura impianto]

[Mancanza materiali]

[Mancanza ordini]

[Guasti]

[Campionatura]

[Set up]

[Produzione scarti]

Gestione ordini ricevuti (a valle)

Domanda 1 pagina 21

[REDACTED]

Domanda 30 pagina 28 + integrazione

[Redacted]

Software: _____

Persona: _____

Che dati sono mantenuti nel software? [Data in cui l'ordine è stato: *ricevuto; promesso di consegna; job order; inizio e fine produzione; consegnato*]

[Numero ordini ricevuti]

Domanda 109-111 pagina 54 + integrazione

[Redacted]

Gestione lamentele e resi? [Numero resi e lamentele]

Software: _____

Persona: _____

Integrazione domanda 74 pagina 43

Come l'azienda affronta gli ordini che presentano stock-out (impossibilità di completare un ordine dovuta alla non disponibilità dei prodotti)? [Numero di ordini in cui si presenta stock-out]

PRODUZIONE

Integrazione

[Redacted]

Domanda 26 pagina 27

Come è definita la pianificazione degli approvvigionamenti di materiali?

[Materie prime necessarie]

Domanda 17 pagina 24

Come è gestito il passaggio della distinta base (BOM) tra progettazione e produzione?

[Materie prime utilizzate]

Domanda 37 pagina 30

Quale supporto viene utilizzato per l'attività di reporting sull'efficienza degli operatori?

[Standard time]

Domanda 38 pagina 30

Quale supporto viene utilizzato per l'attività di reporting sui tempi di attraversamento dei lotti di produzione? [*Velocità di produzione reale*]

Domanda 48 pagina 34

[Redacted]

[*Produzione buona e scarti*]

Integrazione

[Redacted]

[*Costi dovuti a problemi di qualità*]

Gestione delle scorte

Domanda 32 pagina 29 + integrazione

[Redacted]

E per i PRODOTTI FINITI e MATERIE PRIME? [Stock di prodotti finiti disponibili]

Domanda 66 pagina 41

[Redacted]

(situazione inventariale) [*Inventario a libro*] [*Inventario a conteggio*] [*Numero di giorni inventario*]

Domanda 29 pagina 8 + integrazione

[Redacted]

[Numero di giorni in cui vengono pagati i crediti]

Come stai pagando i tuoi fornitori?

[Numero di giorni in cui si pagano i debiti]

Sviluppo prodotto

Domanda 15 pagina 23 + integrazione

[Redacted]

E in che modo i clienti e i fornitori?

Domanda 15 pagina 23 + integrazione

Come viene generato il concept di prodotto?

Aggiungere opzione:

Integrazione

Viene usato lo strumento di brainstorming per la generazione delle idee? [*#Idee brainstorming*]

Vengono tracciate tutte le idee sia quelle scartate da subito, quelle scartate più avanti e quelle effettivamente implementate? [*#Idee screening*] [*#Idee che entrano in sviluppo prodotto*] [*#idee effettivamente implementate*] [*#idee raccolte e adattate dei clienti*]

Come viene allocato il budget? [*Budget PD e Actual*]

Domanda 14 pagina 23

[*Tempo pianificato per progetti PD e Tempo Effettivo*]

[*#PD projects*]

Integrazione

Vengono tracciati il numero di prototipi approvati? [*#Prototipi approvati*]

Viene tracciato il lead time dei PD projects? E i tempi persi? [*Time to market*] [*Tempi persi durante PD*]

E quanto costa mediamente un progetto non andato a buon fine? [*Costo fallimenti in PD*]

[*#Numero di fallimenti*] = PD projects-Prototipi approvati

Miglioramento continuo

Domanda 28 a 38 pagina 28

[Percentuale di documenti digitalizzati]

Integrazione

[Numero di visite tecniche]

[Lunghezza contrattuale media]

[Numero di strumenti lean utilizzati all'interno dell'azienda]

[Numero di suggerimenti dai dipendenti e risparmi grazie a questi interventi]

[Numero di dipendenti con ruoli rotanti]

[Numero di dipendenti che lavorano in team]

[Sondaggi]

FORNITORI CHIAVE

Domanda 21 pagina 6

[*Numero di fornitori per i componenti più importanti*]

Integrazione

Vengono raccolti i suggerimenti dai fornitori? [*Numero di suggerimenti da fornitori*]

Quel è la risposta media in termine di tempo che i fornitori hanno a richiesta da parte della vostra azienda ad un incremento nella fornitura? [*Incremento di volume raggiungibile dai fornitori in 30 giorni*]

STRUTTURA DEI COSTI

Domanda 41 pagina 30



Integrazione

Tenete traccia degli investimenti in M&S? [*Investimenti in marketing and sales*]

[*Costo prodotti venduti*] → conto economico

[*Costo per il trasporto*] → conto economico

[*Ore personale pagate relative all'impianto produttivo*] → Buste paga

[*Costo unitario*] → BOM

FLUSSO DI RICAVI

Integrazione

Tenete traccia dei ricavi da inbound marketing? [*Ricavi da Inbound Marketing*]

[*Ricavi in euro e volume*]

[*Prezzo dei prodotti*]

Pagina 29 domanda 36:

Quale supporto viene utilizzato per l'attività di reporting sullo stato di utilizzo dei macchinari/impianti, con relativi indici di efficienza? (es OEE)

Factors		1/0	Indicators		1/0	Results	
Value Proposition	New products launched Kept products Unitary Price		0		0	THE MINIMUM THRESHOLD FOR FACTORS (50%)	
Customer Relationship	Number of ideas given by customers Number of ideas effectively used by customers Time for testing phase		CURRENTLY MEASURED FACTORS, REPRESENTING OUT OF 99:		0		UNFINISHED TEST
Channels	New leads <i>Marketing qualified leads</i> <i>Sales qualified leads</i> <i>Opportunities</i> <i>Customers</i> <i>New leads from digital channel</i>		0,0%		0	THE MINIMUM THRESHOLD FOR LEAN INDICATORS (40%)	
Customer Segments	Tracking number of customers (end and beginning) Costs of acquiring new customers Revenues per customer One time customer Number of most imp customers		0		0		UNFINISHED TEST
Key Activities	Actual value of Demand Forecasted value of Demand Demand of the entire market		POTENTIAL COMPUTABLE LEAN INDICATORS, REPRESENTING OUT OF 78:		0	Follow - Up As none of the minimum thresholds are met, the company should be assisted by AlzaRating toward structure and measurement	
	Number of orders Orders affected by stock out Returns Claims Order is received Order is processed (job order) Start production of the order End production of the order Order delivery Expected delivery date		0,0%		0		
	Available stock Book inventory Counted inventory Average Inventory Number days receivable Number days payables Number days inventory				0		
	Total ideas brainstormed Ideas entering screening phase Ideas entering Project Development phase Number of PD Failures Budget assigned for PD Actual Budget for PD Occurrences Total time to market (PD Project) Planned time for PD Project Real time for PD Project Collect and adapt customer's ideas Cost of failure (products initially developed but then not launched in the market) Lost during PD phases (overproduction, backlogs, re-works) #PD Projects Number of Prototypes Number of Prototypes Approved				0		
	Good production Bad production Standard time Raw materials used Raw materials needed Real production speed Theoretical production speed Scrap rate Days required to a 20% increase in production Money lost due to quality problems				0		
	Plant opening time Lack of materials Lack of orders Planned maintenance Downtime Sampling Set Up Quality loss (produzione scarti)				0		
	Number of technical visits Percentage of document digitalized Average contract length Number of lean tools used inside the company Surveys (number of feedbacks sent) <i>Number of questions</i> <i>Number of feedbacks received</i> <i>Scores</i> <i>Promoters</i> <i>Detractors</i> <i>Level of satisfaction of customers regarding new products</i>				0		
	Number of suggestions from employees Money saved from employees' suggestions Number of employees rotating tasks within the company				0		
	Key Resources	Number of employees working in teams Theoretical production speed					0
	Key Partners	Number of suggestions from suppliers Number of suppliers for most imp item Volume growth achievable by suppliers in 30 days					0
	Cost Structure	COGS M&S Investments Cost of transportation Paid hours Costs per customer Unitary cost					0
	Revenue Streams	Revenues (€) Revenues (Volume) Revenues from inbound marketing					0

Figure 19 - Structure Assessment Tool (S.A.T.) Interface

LEAN ASSESSMENT TOOL

User's Manual

1st Step

- Chiedere all'azienda i fattori evidenziati dal S.A.T. e le preferenze dei Competitive Factors e delle Lean Perspectives.

2nd step

- Inserire i dati relativi ai fattori nell'interfaccia L.A.T. (solo nella colonna fattori come mostra la figura) assicurandosi di inserire i valori di ogni mese.

Factors	January	February	March	April	May	June	July	August	September	October	November	December
Value propositions New products launched Kept products Unitary Price												
Customer relationship Number of ideas given by customers Number of ideas effectively used by customers Time for testing phase												
Channels New leads <u>Marketing qualified leads</u> <u>Sales qualified leads</u> <u>Opportunities</u> <u>Customers</u> <u>New leads from digital channel</u>												
Customer segments Tracking number of customers (end and beginning) Customers at the beginning Customers at the end Costs of acquiring new customers Revenues per customer One-time customer Number of most imp customers												

- Nella customization section di OGNI Lean Perspective inserire le preferenze fornite dal cliente per i Competitive factor e le lean perspective. (inserire valori da 1 a 10)
 - 1 non importante.
 - 5 mediamente importante
 - 10 molto importante.

CUSTOMIZATION SECTION	
COMPETITIVE FACTOR (CF)	IMPORTANCE
PRODUCTIVITY	
EFFICIENCY	
FLEXIBILITY	
TIME	
CUSTOMER SATISFACTION	
QUALITY	
OEE	
PRODUCTION LEAN PERSPECTIVE	

3rd Step:

- Prestare attenzione ai seguenti fattori
 - Order is received
 - Order is processed (job order)
 - Start production of the order
 - End production of the order
 - Order delivery
 - Expected delivery date

Dal momento che i fattori si riferiscono a un singolo ordine mentre l'algoritmo richiede una media, viene consigliato di seguire la seguente procedura:

1. Di impostare "order is received" a 0 (inteso come istante 0 di ricezione dell'ordine)
2. Calcolare la media dei giorni che intercorrono tra "order is received" e gli altri fattori con giorni come unità di misura.

Esempio: mediamente tra "order is processed" e "order is received" passano 3 giorni e tra "start production of the order" e "order is received" passano 5 giorni e così via. Così sarà anche possibile calcolare quanto intercorre tra i diversi fattori (nell'esempio tra "start production of the order" e "order is processed" sono passati $5 - 3 = 2$ giorni)

Molto probabilmente i dati sui cui l'utente dovrà andare a lavorare sono su Excel per cui una sua conoscenza minima è raccomandata.

4th Step:

- Prestare attenzione alle unità di misura mantenendole coerenti nel tempo. Per andare a fare dei benchmark è necessario che queste siano coerenti per tutti i test fatti.

5th Step: Cognitive GAP Section

- Nella Colonna "Year-1" incollare i valori dei rating che si riferiscono all'anno prima

Cognitive GAP					
Indicators		Competitive factors		Production	
Year	Year-1	Year	Year-1	Year	Year-1

Per quanto riguarda gli indicatori copiare la colonna rating e incollarla nella sezione "Year-1" della colonna indicatori della sezione cognitive GAP. Seguire la stessa procedura per i Competitive Factors e il Final Rating della Lean Perspective (Production nel caso mostrato in figura)

Si considera avvenuto un GAP cognitivo nel momento in cui si ha un miglioramento del Lean perspective Rating (Production nel caso mostrato) o nel rating dei competitive factors. L'utente andando poi a guardare l'evoluzione dei rating degli indicatori potrà individuare dove è avvenuto questo miglioramento riconducendo anche gli indicatori ai fattori.

Indicators	Rating	CF	Rating
Labour productivity	#DIV/0!	PRODUCTIVITY	#DIV/0!
Machinery productivity	#DIV/0!		
Raw material productivity	#DIV/0!		
Yield	#DIV/0!		
Utilization	#DIV/0!		
Overall productivity	#DIV/0!		
Lack of materials	#DIV/0!	EFFICIENCY	#DIV/0!
Lack of orders	#DIV/0!		
Planned maintenance	#DIV/0!		
Downtime	#DIV/0!		
Sampling	#DIV/0!		
Set Up	#DIV/0!		
Overall lead time	#DIV/0!	FLEXIBILITY	#DIV/0!
Recovery time	#DIV/0!		
Production lead time	#DIV/0!	TIME	#DIV/0!
Timeliness	#DIV/0!	CUSTOMER SATISFACTION	#DIV/0!
Good pieces time	#DIV/0!	QUALITY	#DIV/0!
Not good pieces time	#DIV/0!		
% returns caused by defective products	#DIV/0!		
Availability	#DIV/0!	OEE	#DIV/0!
Performance	#DIV/0!		
Quality			

Production Final Rating
#DIV/0!

- Analisi dei risultati:
 - GAP cognitivo positivo (B nel 2018, A nel 2019)
 - GAP cognitivo negativo (B nel 2018, A nel 2019)
 - GAP cognitivo invariato (B nel 2018, B nel 2019)

Nel momento in cui c'è un GAP cognitivo, per cui variano i rating dei livelli più alti.

Cognitive GAP					
Indicators		Competitive factors		Production	
Year	Year-1	Year	Year-1	Year	Year-1

Se in queste sezioni c'è una differenza di rating

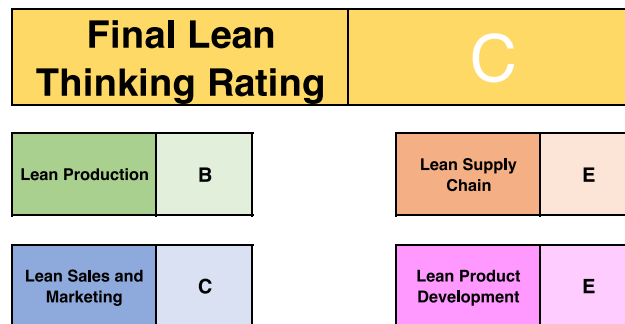
tra "Year" e "Year-1" significa che è avvenuto un GAP cognitivo.

Una volta identificato se c'è stato o no un cambiamento nella conoscenza dell'azienda, si

passa ad andare a vedere dove. Ovvero quali sono stati gli indicatori a migliorare o peggiorare andando ad analizzare le formule e i fattori che li costituiscono, così da poter identificare propriamente dove l'azienda è migliorata e fornire al cliente una analisi completa.

6th Step:

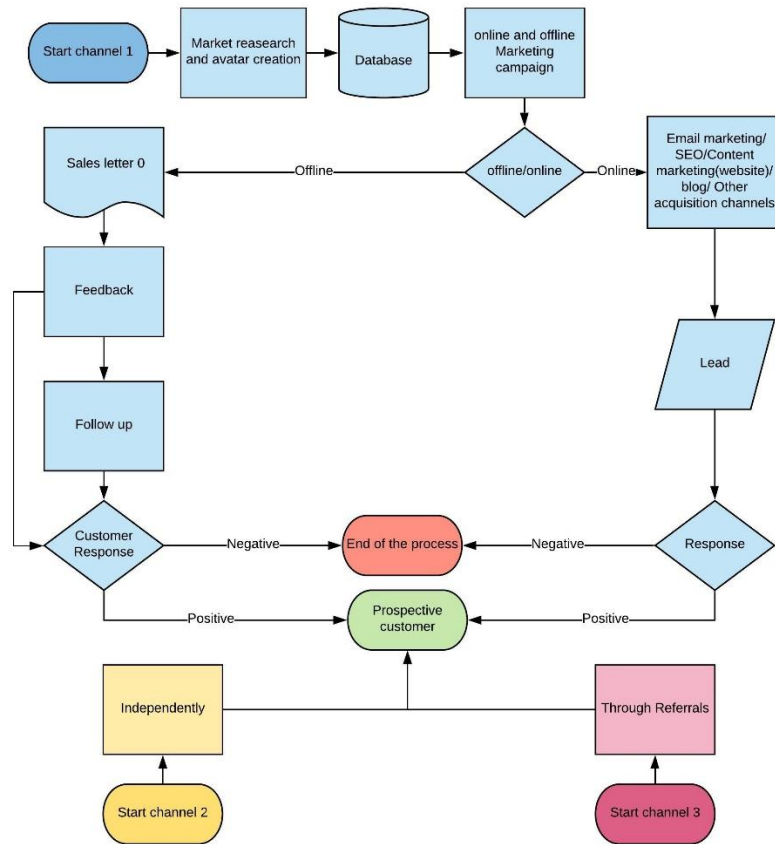
- Resoconto al cliente
Nella sezione "Customer Interface" viene sintetizzata l'analisi come mostra la figura



Viene esposto il Rating finale dell'azienda con i vari rating nelle diverse aree Lean (lean perspectives).

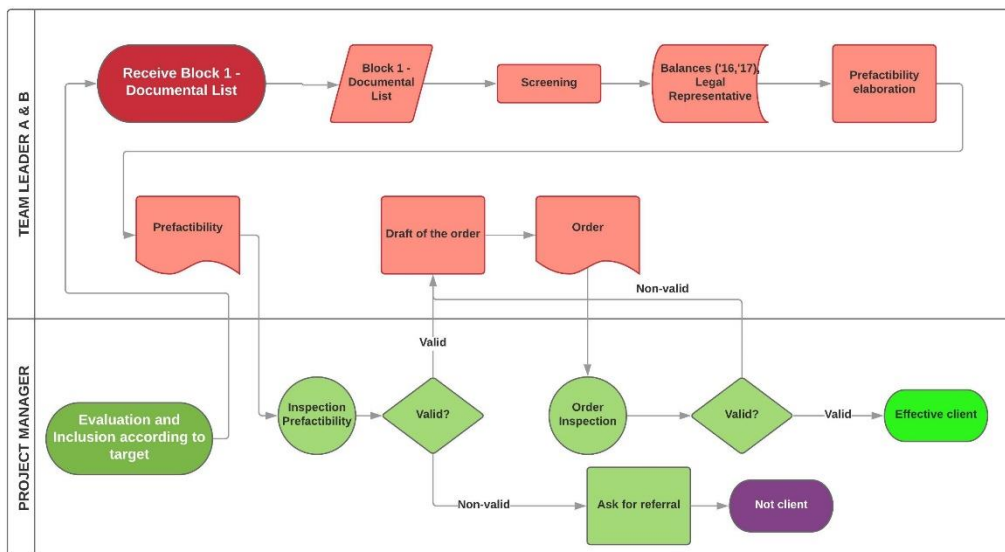
In più un resoconto del consulente con una interpretazione dei risultati ottenuti e del cognitive GAP.

PHASE 0: PRELIMINARY PHASE



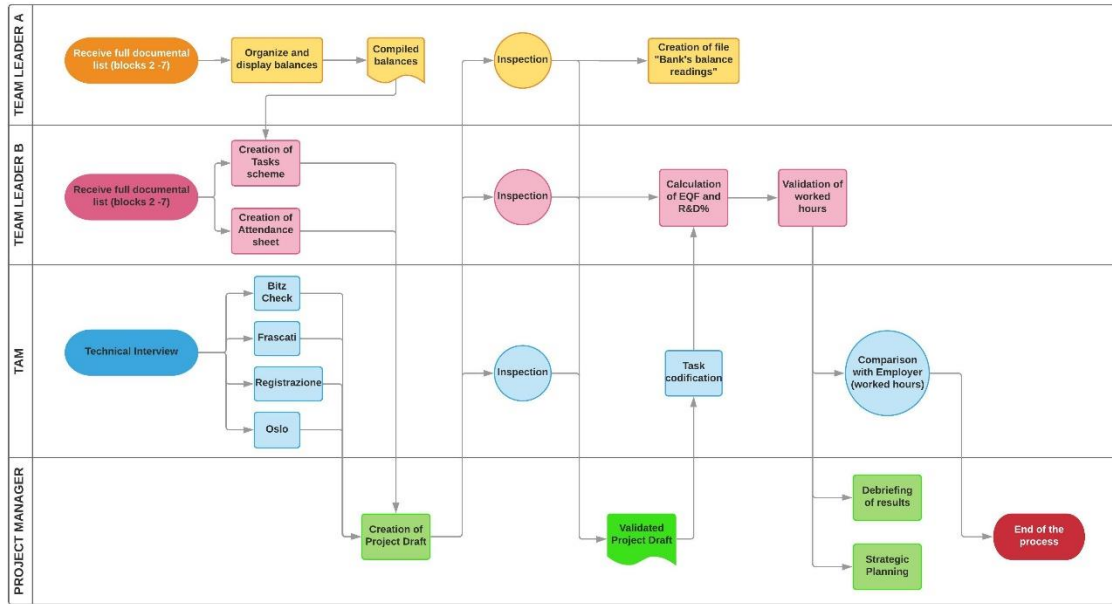
Annex 1 - Preliminary Process Flow Chart

PHASE 1: ON BOARDING



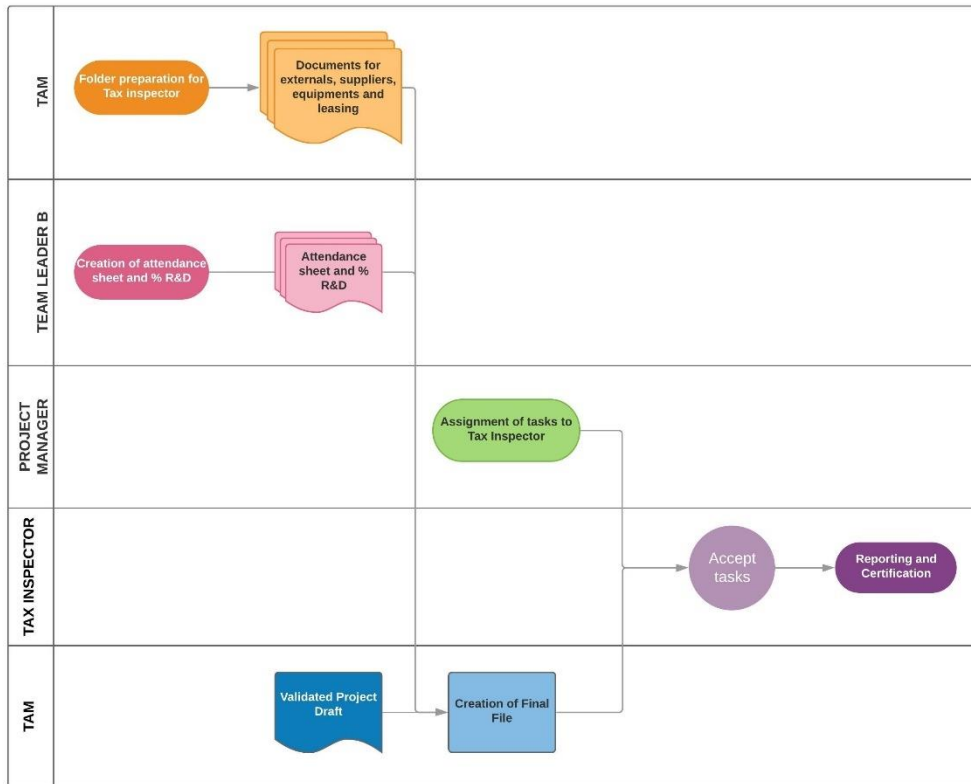
Annex 2 - Phase 1 Flow Chart

PHASE 2: COMPLIANCE AND ANALYSIS



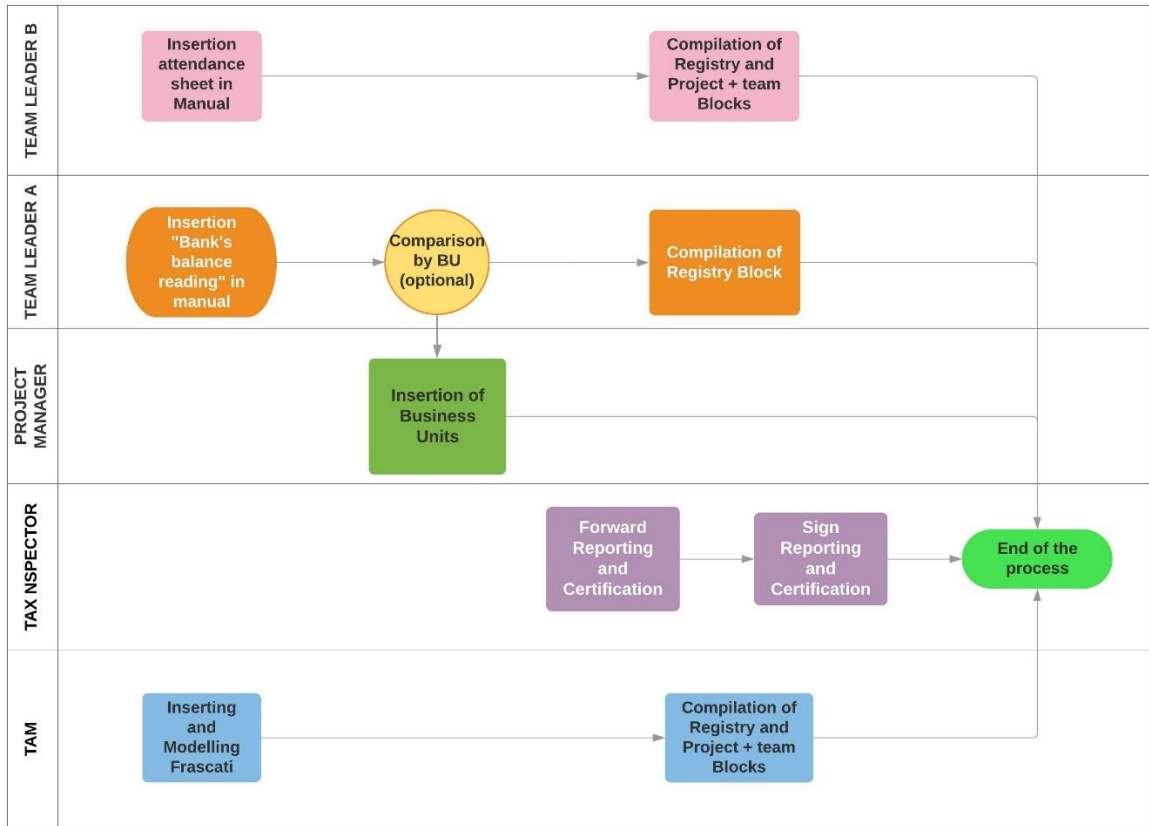
Annex 3 - Phase 2: Compliance and Analysis Flow Chart

PHASE 3: REPORTING AND STATUTORY REVIEW



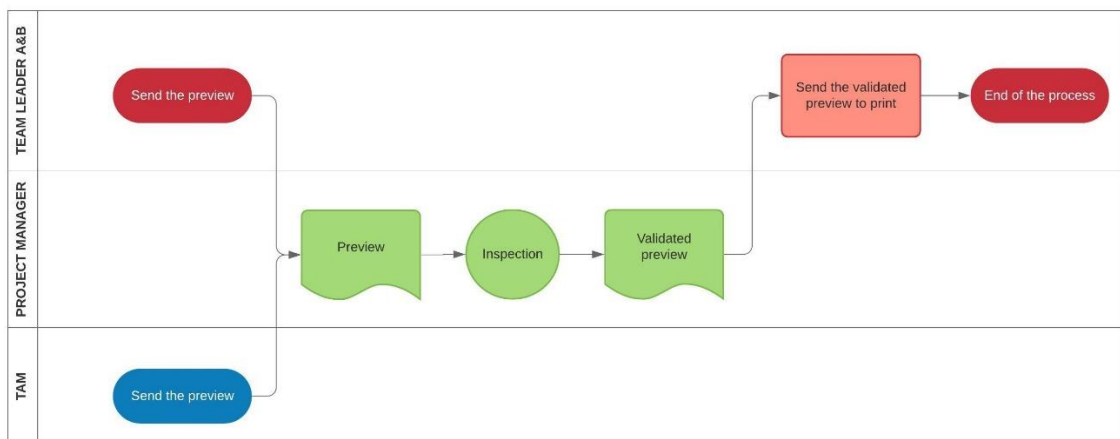
Annex 4 - Phase 3: Reporting and Statutory Review Flow Chart

PHASE 4: RESTECH ASSEMBLY



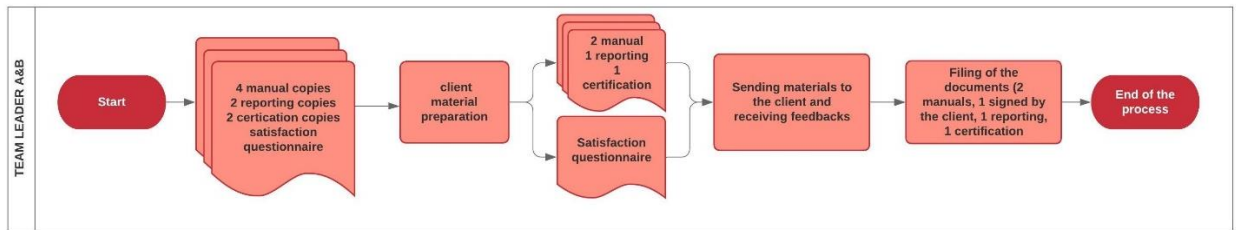
Annex 5 - Phase 4: ResTech Assembly Flow Chart

PHASE 5: CONTROL AND CERTIFICATIONS



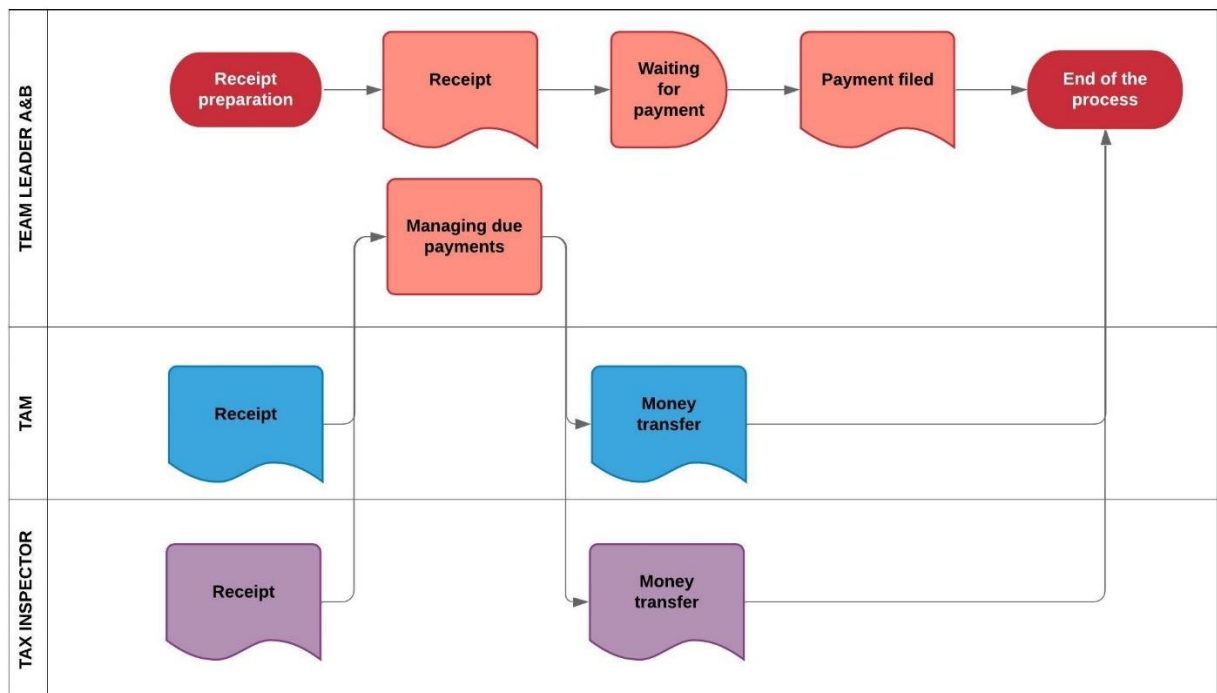
Annex 6 - Phase 5: Control and Certifications Flow Chart

PHASE 6: MANUAL CREATION



Annex 7 - Phase 6: Manual Creation Flow Chart

PHASE 7: PAYMENT



Annex 8 - Phase 7: Payment Flow Chart