
Università Politecnica delle Marche

Scuola di Dottorato di Ricerca in Scienze dell'Ingegneria

Corso di Dottorato in Ingegneria Industriale

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# Intrapreneurship Discovery: Standard Strategy to Boost Innovation inside Companies

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XXXII edition- new series

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# Acknowledgements

This is the end of my journey in obtaining my Ph.D. I have not travelled in a vacuum in this journey. This thesis has been seen through to completion with the support and encouragement of numbers people including my well wishers, my friends and colleagues. At the end of my thesis I would like to thank all those people who made this thesis possible and an unforgettable experience for me.

First of all, I would like to thank to my Ph.D advisors, Professor Michele Germani, for supporting me during these past three years; without his supervision and constant help this dissertation would not have been possible.

I would also thank to Professor Daniela Sani, for his guidance, help and suggestions she gave to me during this project. Under her guidance I successfully overcame many difficulties and learned a lot. It has been an honor to be her first Ph.D student.

I have to thanks Fondazione Cluster Marche and Marche Region that supported me in this period and allowed me to work to this research.

Least but not last, I would like to pay high regards to my father, mother, my boyfriend; I love for their sincere encouragement and inspiration thorough my research work and lifting me uphill this phase of life. I owe everything to them. I will also thank all my friend that support me in these three years.

# Ringraziamenti

Alla fine di questi 3 anni di lavoro, mi sembra giusto e doveroso ringraziare tutti quelli che mi hanno permesso di arrivare fin qua, che hanno sempre creduto in me e che non mi hanno mai abbandonata, soprattutto quando credevo di non farcela.

Ringrazio la Regione Marche per aver investito e per investire ancora nel processo di scoperta imprenditoriale tramite la costituzione dei cluster tecnologici regionali, enti che supportano le imprese nel processo di innovazione radicale piuttosto che incrementale. Senza il supporto della Regione, non sarebbe stato possibile avviare un'associazione e farla crescere in tempi così rapidi, con risultati soddisfacenti per tutto il territorio.

Grazie alla Fondazione Cluster Marche per impegnarsi nella formazione del personale e a tutte le imprese socie del cluster, che garantiscono continuità al lavoro del cluster stesso. Senza la fondazione e le persone che ci lavorano non sarei mai riuscita a concludere questo percorso professionale.

Grazie all'Università Politecnica delle Marche che ha sposato la richiesta del cluster e ha permesso di attivare il dottorato sull'*intrapreneurship discovery;* nello specifico ringrazio il prof. Michele Germani, che ha creduto in me fin dall'inizio; senza di lui non avrei mai potuto accedere a questo percorso e non sarei mai arrivata alla fine.

Grazie anche alla mia co-tutor, prof.ssa Daniela Sani, che mi ha seguito con passione e dedizione, indicandomi sempre la strada, trovando le soluzioni ai miei problemi e dandomi suggerimenti e consigli senza i quali non sarei mai riuscita ad accedere a livelli così alti di formazione. Grazie Daniela, se ho acquisito certe conoscenze e competenze è soprattutto merito tuo. E' stato un onore per me lavorare con te in questi 3 anni.

Vorrei poi ringraziare la mia famiglia; mio babbo Claudio, che mi ha insegnato i valori della vita, mi ha insegnato a non arrendermi, a guardare sempre avanti, a non fermarmi mai e mi ha spronato a fare sempre di più. Mi hai fatto capire che è con la conoscenza che si combatte l'ignoranza e che l'umiltà è la chiave per il successo. Babbo, sei un uomo meraviglioso e io sono orgogliosa di essere tua figlia! Mia mamma Luciana, che adesso più che mai mi ha fatto vedere quanto è bella, fuori e dentro, e quanto è forte. Mamma, sei una forza della natura. Tu mi hai trasmesso la forza, il coraggio, la passione e la tenacia che mi hanno permesso di arrivare fin qua. Grazie mamma, senza di te questa famiglia non esisterebbe. Sei fantastica! Il mio compagno di vita, Antonio. E' grazie a te se ho potuto concludere questo percorso con successo; a te, che mi sei sempre stato vicino, che mi hai appoggiato in tutto, che non ti sei mai lamentato, che hai sopportato le mie arrabbiature, la

mia stanchezza, la mia indecisione, il mio essere sempre in viaggio. Non è facile passare le feste da soli perché la tua compagna è dall'altre parte del mondo a fare ciò che le piace. Ma tu lo hai accettato e mi hai permesso di raggiungere anche questo traguardo. Grazie Antonio; dal giorno che ci siamo scelti, ho sempre saputo che eri il mio futuro.

Vorrei dire un grazie ai miei amici, quelli veri, quelli che ci sono sempre stati e sempre ci saranno. Siete tanti e nominarvi tutti è difficile. Ringrazio però in modo speciale la mia "sturza", Alfonso, Daniele, la mia cucciolina Arianna, Valentina, Samuele e tutti quelli che hanno sempre avuto una parola di conforto per me. Grazie anche al mio dottorando preferito, Gianluca. Sette anni insieme in quel di Ancona, un'amicizia che non avrà mai fine. Sei la persona migliore che mi sia capitata in questa città ed è anche grazie a te se sono sopravvissuta a momenti particolarmente bui e difficili di vita da Ph.D. Grazie alle mie ormai ex coinquiline, Francesca, Federica, Guendalina, che hanno sopportato e le mie brutte giornate. Siete belle!

Spero di non aver dimenticato nessuno e comunque grazie ancora a tutti voi che mi avete permesso di concludere con successo questi tre anni! Tre anni di fatica, sudore e impegno, ma anche soddisfazione, consapevolezza e apprendimento.

# Abstract

Modern companies face a thought competitive environment. Trends such as industry 4.0 or the circular economy require enterprises to innovate continuously in order to remain competitive in the European and global scenario. In this scenario, companies need to develop an innovation and technology strategy and system, which support their business objectives and enable them to develop new products, services or processes to ensure longevity, growth and sustainability in the long term.

This process is called intrapreneurship discovery and it is the starting point of this research. Intrapreneurship discovery is a system, comprised of a portfolio of flexible and coherent innovation and technology management approaches. This approach defines and customizes companies' needs and challenges, through the brainstorming of ideas that generate strengths and weaknesses. The model used to achieve this objective are Visual Thinking Strategies (VTS's) that have been actively tested in regional companies through practical application. After an empirical study, the context in which intrapreneurship discovery can be applied has been defined; basically manufacturing companies set up in Marche Region. Through a comparison of testing activity, the limits of VTS's presented in literature were defined recreated a new one, based on a quantitative methodology rather than a qualitative methodology, more oriented to the redaction of a bankable project.

The model was successfully tested in 4 different value chains and the methodology and results obtained against other VTS's were compared. The research demonstrates that intrapreneurship discovery is crucial for innovation and more and more businesses are approaching this new paradigm to be competitive in global market.

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# Introduction

The research on intrapreneurship discovery started three years before my Ph.D, when I started working at Cluster Marche Manufacturing (1). It was officially set up in 2013; it aims to link the needs of the productive process with the policies of the Marche Region, in the fields of innovation, research and development.

The aim of Marche Manufacturing is to promote and favour the competitiveness of local manufacturing through cooperation and the transfer of innovation between the several actors. The cluster creates synergies and opportunities by transferring knowledge between the different actors involved as well as by facilitating the funding research. Moreover, the cluster promotes networking among regional stakeholders such as enterprises, universities and research institutes to communicate, facilitate cooperation and speed up projects.

The cluster is composed of associate members that pay a small fee to be part of this ecosystem. These members are from universities, public or private research institutions and local companies that cooperate to develop and study the needs of the manufacturing production linked to a smart, mechanized, efficient, eco- friendly and people oriented factories. According to this path, the cluster has to increase its number of associate members, that actively participated to these actions.

One of the main problems the cluster had to face over the years, was the complexity of the regional context: actors are not used to the concept of cluster and they have to see a strong added value to participate in this initiative. Our added value is the intrapreneurship discovery: we started to work with companies to spread, enhance and implement this practice, which allows them to be competitive and innovative.

To improve my skills in this field, in summer 2015, I applied to the EIT Climate Knowledge Innovation Technology (KIC) "The Journey" (2). After a competitive selection, with more than 1000 application, I was one of the 300 Youngsters who took part in the project.

The project was a 5 week summer school with excellent research centres to study and enhance the climate innovation and entrepreneurship. The project started with the validation of ideas to understand the market and to structure a business plan.

During the 5 weeks I worked with students and professionals from all over the world, with different backgrounds and skills.

We worked with people to develop a concrete proposal which will help the environment. In this period, I discovered several tools that helped me to define the validaty of ideas and to determine their value.

The mentors, professors and supervisors of the Summer School passed down to me the interest in open innovation and fostered my desire to study and test tools to develop business idea. For all these reasons, I decided to apply for a Ph.D in the field of intrapreneurship discovery.

In November 2016, I started my industrial Ph.D, without scholarship, to boost my knowledge in this new and interesting area. The Ph.D was supported by Fondazione Cluster Marche (3) and by Marche Region.

# Project Aims

This study is aimed at introducing and analysing the concept of intrapreneurship discovery for companies that need to face a thought competitive environment. Trends such as industry 4.0 or the circular economy have required companies to be innovative in order to compete at the European and global level.

However, instead of generating new ideas and striving for new markets, many companies are focusing on their current fields of activity, optimising processes and services.

Developing new products, services and processes is vital to achieving profitable and sustainable growth. These tasks are becoming more and more urgent and taxing today compared to previous years.

This paper will study new approaches to evaluate and classify the novelty of the product or process promoted by company.

Through this approach, it is possible to define and customise companies' needs and challenges, using brainstorming to generate strengths and weaknesses, until the validation of the innovative idea is reach and the idea is transformed into a prototype.

This paper commences with an overview of intrapreneurship discovery and how this should be applied inside companies. Secondly, a wide range of tools for these decisions are presented, covering different problems that affects engineering managers. These tools are templates called Visual Thinking Strategies, VTS's, that companies compile during workshops. VTS's are standard but at the same time can be tailored to fit a specific need for utilisation by managers to make better decisions. This methodology will stimulate

intrapreneurship, using an intuitive approach, showing business dynamics from another perspective, expanding analysis and synthesis translated into new technologies, products and processes.

This preliminary section of the thesis allows the main tools available in the literature for intrapreneurship discovery to be described and how this methodology can be useful for a company's development and growth.

Chapter two covers the empirical part of the study, based on a survey of 151 small and medium-sized companies, located in the Region of Marche, Italy, related to the sustainable manufacturing or mechatronics sectors, in accordance with the regional Smart Specialisation Strategy.

This chapter highlights the most important factors of the technological and environmental innovation processes and analyses the causal relationship between strategy and structure, the role of innovation in cooperation, intercompany relationships and the dependence on technological innovation capacities.

Managers need a standard methodology to overcome the "grow or die" situation observed in the last few years.

Companies focus more on their activities, optimising processes and services, rather than generating new ideas for business or entering new markets. Developing new products, services and processes is crucial in guaranteeing sustainable and long profitability.

In chapter 3 VTS's are classified and tested in real cases to promote innovation inside local manufacturing companies. In the research, 9 VTS's are described and tested in 42 companies.

At the end of testing activity, the results obtained for each VTS were collected and compared in order to identify the main advantages of each VTS. In this way feedbacks, inputs and comments on VTS's were given and the best strategy could be identified according to their characteristics.

The research determined common characteristics of the VTS's presented in literature and underlined some limitations in all VTS's studied.

As a relevant result of this work a new VTS for the intrapreneurship discovery was assumed and tested inside small groups of stakeholders.

A tool called the Value Chain Tool is a pioneer VTS, because it is the first one to introduce the concept of key performance indicator (KPI) to quantify all the processes in intrapreneurship discovery. It also works for the creation of new value chains; it is not only oriented to the ideation phase but also to carry out a bankable project that should be

presented to investors, or that should be used to apply for regional, national or European funds.

The model is based on “co-innovation”, which incorporates collaboration and co-creation among different stakeholders. It fosters innovation and the creation of new products or services.

The Value Chain Tool was then tested in 4 different groups of stakeholders, made up of companies, universities and research centres.

During the testing activity, the participants were guided and supported in the intrapreneurship discovery process. The testing activity showed that to be competitive on a global level, a manufacturing company should meet the concerns of both external and internal factors. In other words, it should have a clear strategy to define needs and challenges, the strengths and weaknesses of the idea proposed and to decide whether no not go on with the project.

Future actions include a deeper experimental activity to confirm some interesting conclusions drawn here and a straight application of the designed Value Chain Tool to other companies to implement it.

There is a strong necessity for a standardised tool which is not limited to a qualitative approach. A quantitative approach is required, one which carefully considers the specific needs of the individual companies.

It offers a real chance for companies to be versatile and to react quickly to market changes, with flexibility and dynamism, to build new value chains and favour projects in a consortium.

# CHAPTER 1
# INTRAPRENEURSHIP DISCOVERY AND BUSINESS MODELS

In this chapter the concept of intrapreneurship discovery for innovation inside companies is discussed. Starting from a literature study on open innovation, this chapter examines the role of intrapreneurship discovery to support a company's development.

It is widely accepting that during start-up processes, entrepreneurs need to set up several choices to define the product or service offered. This is a very complex task that can be supported by specific tools already presented in literature called visual thinking strategies. This chapter introduces and discusses VTS's.

## 1.1 Innovation and Business Models

The world is changing fast. For many years, companies preferred to produce linearly rather than to circularly innovate. As underlined by Christensen in 1997, the strategy was "more of the same" the meaning of which was referred to the same line of value propositions, using the same technologies and reaching the same target.

This strategy was functional until the advent of industry 4.0 and globalisation. These new aspects required profound and substantial changes, forcing businesses to carefully examine customer demand and to design strategies that satisfy all stakeholders involved in the value chains [1].

To reach this goal, a substantial transformation of the market ecosystems should be addressed by companies [2].

Companies need to speed up their strategies, addressing societal and economic challenges through the creation of new products and services [3] that boost economic growth and position the human capital at the centre of innovation in manufacturing [4].

Companies change their vision [5]; they require new technologies and new approaches to enhance and valorise their products and services, as well improve the efficiency of operators [6]. They have to evolve in order to thrive and survive.

Businesses clearly cached up the needs to accelerate innovation and transition. To achieve this, business and innovation models had to be employed, combining empiric-adaptive with deterministic-normative elements of innovation processes, towards highly integrative methodologies, where the former were aimed at increasing speed and the latter were

targeted at increasing efficiency. At the same time, focus will be on the integration of two functionalities: “prototype production” and “innovation”.

The primary objective of this research is to boost innovation and business creation inside companies, by creating and promoting research and development.

The effects of technological change on the global economic structure are creating immense transformation in the way people communicate and obtain information, influencing both the economy and society [7]. This has led to an acceleration of technological development; technologies have a high potential for innovation and can be integrated and adopted in different businesses and sectors.

The development of information and communication technologies (ICT) is influenced by globalization affecting the costs and quality of ICT and society [8].

The acceleration of technological progress, the introduction of industry 4.0 and the new concept of circular economy require higher innovation capacity, integration and an interoperable system.

Akintude [9] emphasised the importance of expertise and highly specialised personnel who are constantly updating themselves and have the intrinsic desire to grow, to know, to discover, and to be able to use these technologies with extreme awareness.

This globalised world requires qualified personnel, constantly formed, with a high level of experience and expertise, who can use these new technologies.

It is human capital that develops technology, makes improvement and therefore decrees the success of a company. It is human capital that has the intrinsic power to generate value for the company itself. To be competitive in the world market, companies must invest in human capital, focusing on skills.

Human capital is the key factor for the company and has the power to generate value. Companies are more and more aware of this aspect and are investing in training.

The training necessary to make the best use of new technologies is still far from complete, but the current scenario shows that we are in a phase of experimentation [10].

Qualified staff are more productive and able to generate ideas that can lead to new products or services. Investing in R&D is crucial to improve company’s efficiency and competitiveness, stimulating the market’s growth.

This effect allows the transfer from a sustaining innovation to a disruptive one. While the first one is limited to reducing costs of production and to improving product quality, the second one is more and more linked to scientific, technological development and to sustainability.

The complexity of the technologies can be overcome through the close collaborative relationship between research and industry, between the productive and scientific sectors, which guarantees innovative, competitive and dynamic, extremely flexible technologies that can operate in different contexts [11].

All these elements have changed the economic and entrepreneurial scenario, moving from a competitive system to a collaborative one, promoting cohesion and economic integration. Chesbrough [12] defined this phenomenon "open innovation".

## 1.2 Open Innovation: What exactly is Open Innovation?

The term is widely used in business and academia, and most of the world's 500 largest companies talk about open innovation in their strategy [13]. Despite the large diffusion of this term, there are many different academic definitions of "open innovation" and companies use this word in many different ways and to varying degrees. According to this idea, open innovation is a tool that helps companies define and shape their business.

Going back to the central question, Open Innovation is about to outsource part of the innovation process outside the company [14]. It starts with the analysis of customers' needs, by verifying possible solutions and the main risks.

When you have decided to go ahead with a promising idea, it is generally necessary to perfect the idea using a viable technology. Based on the technology platform, which may be far from the end products being developed the product itself, will end up being marketed. Each of these five steps can be wholly or partially contracted to an outside entity outside of society, and that is Open Innovation.

From an entrepreneurial point of view, open innovation is a way to capture new ideas that can improve the growth of the company. As underlined by Miles [15], this concept in the entrepreneurship literature is similar to the one of collaborative entrepreneurship, which is "the creation of something of economic value based on new jointly generated ideas that emerge from the sharing of information and knowledge".

According to Chesbrough [16], innovation has always been viewed as a process that take place within the boundaries of a company. Chesbrough has also observed that firms are taking advantage of the reality that not all the smartest people work for a company, and that a company does not have to conduct the research to profit from it.

This simple idea influences the way a company can innovate; it can be the company that takes innovation from other companies, or it can contribute to other innovations.

In literature, [17] there are some erosion factors that allow the transition from a closed innovation model to an open one. These erosion factors are for example the increased mobility of workers, more capable universities, more start-ups, ICT and IoT that influence the conditions under which firms innovate.

As explained by this scenario, the erosion factors are the core of why open innovation reflects a paradigm shift. They challenge the basic assumptions, problems, solutions and methods for the research and practice of 21st century industrial innovation.

In the past years, the way firms innovate has changed: innovation is no longer limited to the realm of the firm, and it has, in many industries, moved from a closed to an open process.

Hence, the notion of "open innovation", that is "the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation, respectively" [18].

The main concept at the basis of the open innovation model, is the fact that firms explicitly cooperate with other actors, including customers, rivals, academics and firms in unrelated industries, to create innovations. Therefore, the premise at the basis of the open innovation paradigm is that all the knowledge necessary for creating innovations is no longer present within the firms' boundaries; consequently, a company needs to acquire knowledge from other sources [19].

As affirming by West [20], this paradigm, considering R&D as an open system, assumes that valuable ideas can come from inside as well as outside the firm, and can be taken to market through external channels, from inside or outside the company, that has, as a consequence, multiple points of contact with technological innovation requiring the contribution of both information and experience from different functions within the business unit. It should also point out that open innovation is a key point for companies that are looking for innovation.

According with Chesbrough, [21] open innovation means that valuable ideas can be gained from both inside and outside the company, but the key aspect is the contamination and cross-fertilisation among different stakeholders.

West and Gallagher [22] argued that "the premise at the basis of the open innovation paradigm is that all the knowledge necessary for creating innovations is no longer present within the firms' boundaries". This concept means that companies are looking for external sources to support them in the acquisition of knowledge. According to this idea, open innovation is a tool that helps companies define and shape their business. Going back to

the central question, open innovation is about to outsource part of the innovation process to actors outside the company.

The process of innovation could be a long process. It starts with the analysis of customers' needs, verifying what are the main risks and the possible solutions. After moving forward with promising idea, it is common practice to perfect the idea through a viable technology. The paradigm assumed by open innovation is that firms can and should not only allow internal but also external ideas or paths to enter in the market. According to this path, R&D should be treated as an open system, where some concepts can be shared between different companies [23].

The need for open innovation is related to the following drivers [24]:

- the globalisation of technology development requires a global approach to technology;
- the dynamic environment in which companies work, necessitates specialised and skilled staff that can demonstrate and use new business tools and strategies to which the technologies and activities of companies must adapt;
- the rising competition increases the pressure on R&D to improve effectiveness;
- fast changing and less predictable economic environment and therefore, diminishing opportunity streams;
- the sustainable development goals and circular economy;
- the complexity of technological development needs a more systematic approach.

## 1.3 What is intrapreneurship discovery?

As mentioned in the previous paragraph, modern companies face a thought competitive environment. Trends such as industry 4.0 or intelligent factories require enterprises to innovate continuously in order to remain competitive in the European and global scenario. Industry 4.0 was for the first time introduced in Germany at the Hannover Fair in 2011 as "Industrie 4.0" by a group of representatives from different fields (such as business, politics and academia) under an initiative to enhance the German competitiveness in the manufacturing industry. The term represents the fourth industrial revolution and it has been coined by Klaus Schwab, founder and executive chairman of the World Economic Forum [25].

Miller [26] described the fourth industrial revolution as a completely new environment, where people will use new technologies to communicate and manage their lives. This fourth

industrial revolution is focused on physical and digital technologies that will influence all economies and industries.

For the first time, technologies will be embedded within societies. These technologies include a huge number of fields such as artificial intelligence, robotics, internet of things, cloud, 3D printing. The technologies should communicate and interact each other, exchanging data and information.

Subsequently in a short time, due to economic and other ties to Germany, this concept was introduced also in Italy. However, we can see it in other countries as well. In Italy, industry 4.0 includes production based on technological progress, which wipes out boundaries between the digital and physical worlds and enables companies to implement smart interconnected systems supporting activities throughout the whole production value chain; it includes the smart world of industrial devices that communicate with each other.

In other words, production is transformed from stand-alone automatic units into fully automatic and continuously optimized manufacturing environments. Production facilities will be connected to make cyber-physical systems (CPS), which will be the basic building components of so-called smart factories.

Another important concept that can not be neglected is circular economy. More than 100 different definitions of circular economy are used in scientific literature and professional journals. There are so many different definitions in use, because the concept is applied by a diverse group of researchers and professionals [27].

The different definitions make it more difficult to have a clear concept. In any case, all of them focus on the use of raw materials or on system change. Definitions that focus on resource use often follow the 3-R approach [28]:

- Reduce (minimum use of raw materials);
- Reuse (maximum reuse of products and components);
- Recycle (high quality reuse of raw materials).

On 2 December 2015 the European Commission [29] presented a new circular economy package where circular economy is represented as a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products for as long as possible. In this way, the life cycle of products is extended.

In practice, it implies reducing waste to a minimum. When a product reaches the end of its life, its materials are kept within the economy wherever possible. These can be productively used again and again, thereby creating further value.

In this way there is a change from the traditional, linear economic model, which is based on a take-make-consume-throw away pattern to a new one [30]. This model relies on large quantities of cheap, easily accessible materials and energy.

The transition to circular economy offers extraordinary potential for the establishment of emerging industries and of new innovative cross-sectorial value chains that can support European re-industrialisation addressing economic, environmental and societal challenges at the same time.

Circular value chains, in fact, integrate in a synergic way both manufacturing and de-remanufacturing processes (i.e. activities aimed at recovering, re-using and upgrading functions and materials from industrial waste and post-consumer high-tech products) [31].

Circular economy requires the innovation of the productive value chains, which have to re-design their products to make them more adaptable to disassembly, testing, reuse, remanufacturing and recycling. Through such a re-design, products can become smarter e.g., embedding sensors and allowing the collection of information during the use phase.

The introduction of industry 4.0 approaches, besides enabling circular economy, opens the way for the offer of new added-value services in the frame of innovative business models and allows more effective integration and synchronization of value chain partners that operate in a wider EU specialised network.

Overall, in order to be competitive in this scenario, value chains must adopt new approaches and advanced technologies on a broad scale, combining the necessary technological enablers that can guarantee quality and efficiency of operations (e.g. collaborative robotics, flexible automation, additive and micro-manufacturing, advanced materials, virtual and augmented reality, industry 4.0, etc.).

This innovation process can have various triggers: it can start either from the re-visitation of existing production value chains under the lenses of circular economy, or greenfield, when new integrated manufacturing, de - and remanufacturing value chains have to be implemented to establish the businesses enabled by disruptive innovations (e.g., in the fields of nano and biotechnologies, microelectronics, etc.). However, whatever is the trigger of innovation, approaching value chains design and innovation through the lenses of the circular economy paradigm guarantees a systemic innovation towards economic, environmental and social sustainability.

These new approaches should change the vision of companies. Usually the entrepreneurs focus on the process or the product; they think that to acquire a new robot, or a new technology is the same as innovating. On the contrary, if they really want to innovate and be competitive in the global scenario, they have to generate new ideas, enter new markets and develop new opportunities for business.

However, instead of generating new ideas and striving for new markets, many companies are focusing on their current fields of activity, optimizing processes and services.

Developing new products, services and processes is vital for profitable and sustainable growth. And these tasks are becoming more and more urgent than in previous years [32].

The companies we work with face an array of external and internal challenges: globalization, new and more competitors, demands for faster rates of innovation to realise market potential, the costs for the development of new technology and more and more aware consumers.

In this scenario, companies need to develop an innovation and technology strategy and system, which support their business objectives and enables them to develop new products, services or processes to ensure them long life and sustainability in the long term.

According to our research we called this process **intrapreneurship discovery** and it is the starting point for the analysis of a successful project.

The intrapreneurship discovery is a system, which includes a portfolio of flexible and coherent innovation and technology management approaches.

The basic idea is that to be competitive companies require and stimulate radical business model innovation, which will be supported by the intrapreneurship discovery.

Through this approach, it is possible to define and customize companies' needs and challenges, through a brainstorming of ideas that generate strengths and weaknesses, until reaching the validation of the innovative idea and the translation of the idea in a prototype.

The main steps of intrapreneurship discovery can be summarised as follows [33]:

- Empathize → Begin by deeply understanding customers' problems. This requires understanding customers in their environment and gaining empathy;
- Define → Do not jump to solutions before having cleared customer's problem. This means being open to changing the initial definition of the problem according to customer's requires;
- Ideate → Use brainstorming to generate alternative ideas and address customer's points;

- Prototype → Develop low-resolution prototypes of the solution. Focus on prototypes that will test the key insights you have about the customers. Do not let the perfect be the enemy of the good.
- Test → Share the prototype with the user and listen carefully for their reactions. Use these to develop deeper insights into their needs.

According to our research, the approach of intrapreneurship discovery is a methodology that stimulate and encourage creativity. It enhances ideation and provides some initial data about customer acceptance, about the value proposition of the solution proposed.

The approaches studied have been actively tested in regional companies through practical application. Methods are flexible and scalable and can be used together to provide a total innovation and technology management development programme or they can be used selectively for specific needs and challenges of companies.

The selected companies which test these tools are mainly manufacturing and technology intensive companies. Their ideas have been analysed and spread across three core elements of innovation and technology management:

- The strategy;
- The system;
- The organisation.

Every company requires new ideas to survive and grow profitability and, hence, it has to find ways to tap the entrepreneurial potential.

As affirmed by Hamel [34], intrapreneurship is a potent tool for delivering innovation in particular and for enhancing companies' profitability.

Recently, this concept has become and more stressful, and research centres, universities, and literature started to promote courses and scientific article of this new discipline.

The intrapreneurship concept is a completely new method, developed in recent years and which arrived as a formal recognition of entrepreneurship through the works of Gifford and Elizabeth Pinchot [35] who coined the term in 1978 and later credited to Gifford Pinchot III by Norman Macrae in the April 17, 1982 issue of The Economist. The concept was however popularized in their book *Intrapreneuring: Why You Don't Have to Leave the Corporation to Become an Entrepreneur* (1985).

Literature has defined intrapreneurship in a variety of ways. The Pinchotts [36] refer to intrapreneur as someone who possesses entrepreneurial skills and uses them within a

company, instead of using them to launch a business of his or her own. According to this vision, intrapreneurs:

1. Usually go well beyond their narrow job descriptions, providing invaluable help in innovating some aspects of their companies (*pro-activeness and risk-taking*);
2. Help established firms to implement innovative policies and procedures or introduce innovative products or service (*innovation*).

For Stevenson and Jarillo [37], intrapreneurship is a process in which individuals inside organisations pursue opportunities without regard to the resources the currently control, while Vesper [38] defined it as doing new things and departing from the customary to pursue opportunities.

According to Hisrich and Peters [39], intrapreneurship is a spirit of entrepreneurship within the existing organization. Some of the definitions have been narrow and focused on large organisations to the exclusion of smaller organisations.

For the purpose of this study, we defined intrapreneurship discovery as a new methodology that helps companies to shape ideas into innovation, into reality. It is a concept linked to the entrepreneurial orientation of an organisation and one of the objectives of this research is to encourage and favour the awareness on intrapreneurship. Fostering an intrapreneurial environment means taking risks and trying to solve a problem with a different approach [40].

Intrapreneurship discovery fosters the development of new ideas taking care of the time, space and resources required to turn them into reality. Ideas are the heart of a business. Organisations that sustain ideas and innovation among their staff have a better chance of survival in a competitive economy.

The research demonstrated that not all ideas could be transformed in a prototype or in a product; however, the aim of intrapreneurship is to underline the strengths and the weaknesses of ideas and decide to keep going or leave this path.

## 1.4 Visual Thinking Strategies

Before open innovation, a company's development was done via long, tedious business plans, reports and documentation which hindered innovation and made development cumbersome, incomprehensible and prohibitive. Intrapreneurship discovery proposed a simple and intuitive methodology that can be applied in all companies [41].

In literature, there isn't a universal business model, but on the contrary different tools can be used for this open approach. These models are called Visual Thinking Strategies, VTS's [42]. Visual techniques give "life" to a business model and facilitate co-creation.

VTS's are the major expression of Design Thinking, an interactive, nonlinear, visual way process in which companies redefine their problems and identify alternative strategies and solutions. VTS's are used for mapping ideas, underlining patterns and relationships. Through these innovative models, companies plan, strategize and solve problems.

They are the most effective way to know and represent knowledge. "Visual Thinking", literally "think through images" is a new innovative way of work, that used a visual and intuitive approach to create ideas. It is a method for knowledge transfer that is based on images.

According to Hulme [43] VTS's allow us to:

- Achieve brilliant ideas;
- Identify and share goals;
- Analyse stakeholders;
- Define the channels to reach those stakeholders;
- Evaluate available resources and balance them;
- Plan in a collaborative way, favouring "team working";
- Evaluate and quickly decide the feasibility of the idea;
- Take off blocked projects.

In recent years, business model has been the focus of substantial attention by both academics and practitioners [44]. According to their studies, the business model can play a central role in explaining firm performance. That's why companies are drawing attention to this new approach. Through the use of VTS's entrepreneurs can make more informed decisions, evaluate in advance possible risks and increase the rate of success.

VTS's are about visualizing and imagining something that does not currently exist and would take care of users' needs. They are about prototyping, giving the product to the consumer and then improving it [45].

VTS's, above all the ones on intrapreneurship management, have a common goal: stimulate intrapreneurship, using an intuitive approach, showing business dynamics from another perspective, expanding analysis and synthesis translated into new technologies, products and processes [46].

VTS's underline criticism inside companies and work to define the best solution, according to companies' strategies and possibilities.

According to our research and testing activity, VTS's support companies in their innovation processes because are intuitive. For the first time, companies do not have a frontal lesson, but they actively participate, with an interactive model to get out ideas and comments.

VTS's are collaborative and interactive. They can be used in group discussions, workshops and retreats that encourage participants to challenge current practices and assumptions, seek out alternatives and engage in new approaches.

VTS's enhance strategic inquiries by making the abstract concrete, by illuminating relationships between elements, and by simplifying the complex.

The research evidences that all studied VTS's passed through three different phases [47], as reported in Fig. 1.1.


*Figure 0.1.1 Phases of VTS's*

In the first phase, exploration, the ecosystem is identified, the need of customer. What kind of need does a company have to satisfy? Are there new players? What do companies have to do to be competitive?

Once the ecosystem and the customer are clear, it is time to pass to the ideation, the identification of new ideas. What do companies need to reply to customer need? What kind of innovation?

Once the concept is done it is possible to pass to the validation of the idea proposed.

During the research, we figured out common aspects for VTS's, such as:

- Flexibility: ability to modify action and tasks that influence the business strategy and impact on value chains;
- Focus: the value of the solution proposed;
- Transparency: more time to easily understand the business model and the opportunity to discuss strengths and weaknesses of the proposed idea together;

- Based on open innovation models: if a company works in isolation from other firms, it will not be exposed to information, solutions and the exchange of opportunities or ideas.

To start using one of the VTS's for intrapreneurship discovery, the first thing to do is to print it out or project it on a whiteboard and start to answer the brainstorming.
According to Teece [48], VTS's reflects "*management's hypothesis about what customers want, how they want it and what they will pay, and how an enterprise can organize to best meet customer needs, and get paid well for doing so*".
Starting from this concept, VTS describes how the entrepreneurs should deliver value to customers, what are the main aspects that influence the sustainability of the company, what are the key elements that make a project successful and how to manage the organization.
All these aspects cannot be random but, on the contrary, represent strategic choices to pursue a competitive advantage.
In chapter three we will better analyse VTS's presence in literature and how they can be tested inside companies.

## 1.5 Conclusion

Intrapreneurship fosters proactivity and enables a continuous stream of innovation which drives the development of new products and services.
While many employees tend to do their work in a repetitive way, intrapreneurship increased skills and capabilities, offering a new approach to implement ideas and achieve success.
Promoting this attitude within company's culture will raise the number of innovations being pursued and adopted, leading to new product and services being released in established and new markets.
To achieve this goal, company has to encourage intrapreneurial thinking, which is essential in gaining a competitive advantage; a dedicated intrapreneurship strategy enables companies to reach high performance, bringing them a high production level.
The importance of releasing new products or services for customers is a key factor for companies. The capacity to reply to markets in a short time determines more than ever the success of a company.
According to this path, intrapreneurship discovery will support companies in testing and validating their ideas; after this process the company has a clear vision about the possibility

of following up with the idea and transforming it into a product or service, or eventually leaving it.

Revitalising a company's strategy is necessary to survive in a globalised world; intrapreneurship discovery can be used to calculate the risk of a new product or service, helping to be proactive in this scenario [49].

In this field, intrapreneurship discovery is understood as a task, a tool independent from the way that it is performed, but essential for testing an idea's value and feasibilities. And none of this is possible without people who have the knowledge, skills and motivation to create and manage these systems and who are supported by a positive and open company culture. People are also central to any company and one of the most difficult points within companies is to have clear support and encouragement from the top management.

The intrapreneurship discovery has a bottom up approach, but the transformation should start at the top and be measured at operational level.

The focus of the activity done in the first year was to develop this innovative culture within the regional companies. They are not used to doing brainstorming or managing ideas. Usually they work for tasks, following traditional rules and methods.

The approach used, in this sense, is completely new and works outside the traditional norms. Companies are stimulated to take the risk to think outside the box and move towards a higher degree of externally oriented collaboration for innovative development.

Of course, it is not possible to have all brilliant ideas, but it is possible to have failure. Failure means that from the analysis done the idea is not advanced enough or it can't overcome specific required challenges to be successful in the market.

Nevertheless, one of the companies who started the process of intrapreneurship discovery said "failure needs to be celebrated, so that we can learn from it". However, when the ideas generated can be transformed into a successful project, their story can form the basis for motivating other companies to adopt similar open innovation approach.

As we have argued, a company's innovation and technology strategy should support its business objectives. This strategy has implications for the management of the innovation, including our understanding of where innovation comes from, how it can be concretised in practice and how it should be managed. These aspects will deeply change the company's strategy.

With an increasing interconnection between different companies and actors, we would expect a higher number of companies that adopt intrapreneurship discovery.

A good innovation and technology strategy ensure that the company focuses its R&D resources on the 'right' markets and products – and their underpinning technologies – in order to achieve its objectives. But this is a complex task when there are so many factors affecting strategy development.

As argued, there will be no innovation in a company without creative ideas from individuals. Nevertheless, the ideation process should be developed and implemented with a clear strategy.

Intrapreneurship discovery is the answer to changing market conditions and customer needs. In a digitalised and green area only businesses who will adopt this approach will be among the first few to actively access broad knowledge and thus provide better, faster and cheaper solutions than others.

The research also demonstrated that intrapreneurship discovery can be manifested in different ways. First, it can represent in itself, a form of innovation, by introducing new methodologies or modifying the internal operations of the firm improved efficiency.

On the other hand, intrapreneurship discovery will support companies to enter in a new market, guiding their choices.

Moreover, intrapreneurship allows for the anticipation of problems, rapidly correcting potential deviations from the targeted objectives, and projecting the natural evolution of technology and society.

All these aspects reinforce the idea that intrapreneurship discovery is a good strategy to define, adjust or improve a product/ service and needs further research effort.

Firms need to innovate in response to changing customer's lifestyles and demands. Moreover, innovation will play a crucial role in the creation of value and in sustaining competitive advantage of the company.

As show in figure 1.2, the intrapreneurship discovery is a completely new approach that received huge approval at an international level. During the conference in New York, we presented the work done in a paper that received an award.


*Figure 1.2 Certificate of Best Paper*

Nevertheless, the research demonstrated the interest of companies to explore this methodology. In the coming years, the main idea is to continue with testing activities also outside Marche Region.

# CHAPTER 2
# DEFINITION OF CONTEXT AND BACKGROUND

In this chapter the key drivers of the innovation process and the main factors that influence innovation are underlined. Starting from a literature study on industry 4.0 and the circular economy, this chapter examines the state of the art of these two aspects at a regional level. The empirical part of the study is based on a survey of 151 manufacturing companies that represent the 34% of that universe at the regional level. The survey underlined the main criteria that influence companies in their decision processes.

## 2.1 European Context

As underlined by Eurostat, manufacturing is still the driving force of the European economy, representing over €6,500 billion in GDP and providing more than 30 million jobs. It covers more than 25 different industrial sectors, largely dominated by Small and Medium Enterprises (SMEs) [50].

The manufacturing sector is primarily composed of SMEs which account for around two-thirds of its business. These organisations usually have fewer resources and are more vulnerable to economic fluctuations such as the 2008 financial crisis. They must also cope with increasing global competition and the resulting pressure to cut costs and reduce margins.

Additionally, the current third and fourth industrial revolutions categorized by the World Economic Forum as respectively “Electronics, IT, automated production” and “cyber-physical systems” have created (and will keep on creating) extensive pressure on industrial production systems.

Moreover, with 36% of the world market, Europe is the world's largest producer and exporter of sustainable manufacturing technologies, systems and automation solutions (4). The competitiveness of the industry relies on excellent, innovative products, know-how and skills, and on the ability to comply with manifold customers' requirements. The establishment of a critical mass of innovative machines and industrial solutions for new circular businesses will further improve the sector of sustainable manufacturing technologies and its export.

This is as much a threat as an opportunity for European industries to claim their excellence. Europe is a global leader in the development of Key Enabling Technologies (KETs), however our record in translating this competitive advantage into marketable products and

services does not correspond to this position [51]. This innovation gap determined a decrease in the usage of KETs for manufacturing in European Member States. What is more, European patents are increasingly being exploited outside the EU.

Therefore, the European Strategy for KETs aims to accelerate the rate of exploitation of KETs in the EU and to reverse the decline in manufacturing to stimulate growth and jobs. Countries and regions that fully exploit KETs will be at the forefront of advanced and sustainable economies. Furthering KETs deployment will contribute to affect reindustrialization, energy, and climate change targets simultaneously, making them compatible and reinforcing their impact on growth and job creation. Foresight studies show that the massive integration of advanced manufacturing will in a few years displace many of the current traditional manufacturing processes. In particular, energy and resource-efficient and low carbon technologies and the circular economy will be key drivers of innovation in SMEs in the coming years [52].

SMEs are set to be the future drivers for job growth in KETs. To remain competitive, manufacturing SMEs will increasingly need to rely on advanced manufacturing technologies.

However, to ensure this success, innovation and defined strategy are crucial, especially for SMEs that are generally lacking in their innovation processes.

This lack is due to the difficulties they have into scouting technologies and to implementing them inside their processes.

The aim of our research is to look at the manufacturing sector on a global level, identifying all gaps and mismatches, and using this to design a set of innovative training approaches for analysing the main target.

## 2.2 Manufacturing in Marche Region

In this European context, Marche is one of the most specialised and artisanal regions, one of the most industrialised in Europe, with a strong entrepreneurial attitude but still too focused on traditional production rather than innovation [53].

It holds the national record of production centers, hosting leading companies that are complemented by small companies in manufacturing output (the supply chain is usually composed by big firms in subcontracting components' production to SMEs).

Marche is ranked in 9$^{th}$ place out of 131 European regions considered - whose population is above 1.5 million people- in terms of incidence of people employed in manufacturing

out of the total employed population [54]. In 2014, the Marche productivity model was considered, in Italy and abroad, a successful model, able to attract important national and international brands. The large and widespread network of SMEs play a role as a fundamental competitive success factor in the creation and production. The strong entrepreneurial attitude, the manufacturing tradition (especially in footwear, furnishing and mechanics) production, the handcraft and intellectual know-how are the core elements for Marche business leadership.

According with ISTAT, Marche has 159.100 firms set up in the five provinces (Fig. 2.1).

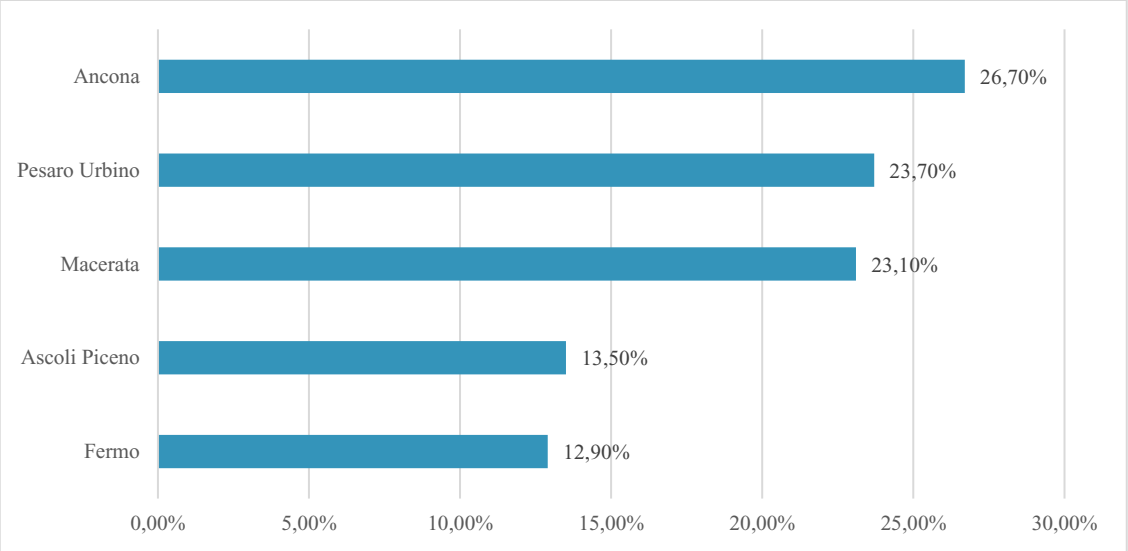



*Figure 2.1 Active Companies, Marche Region (Source: Le Marche in Cifre, Ufficio Statistica Giugno 2017)*

The Marche are ranked 16$^{th}$ in Europe in terms of people employed in the manufacturing sectors.

The sector is characterized by a large number of SMEs, usually family run and the total number of employed is 178.000 divided in the following sectors (Fig. 2.2).

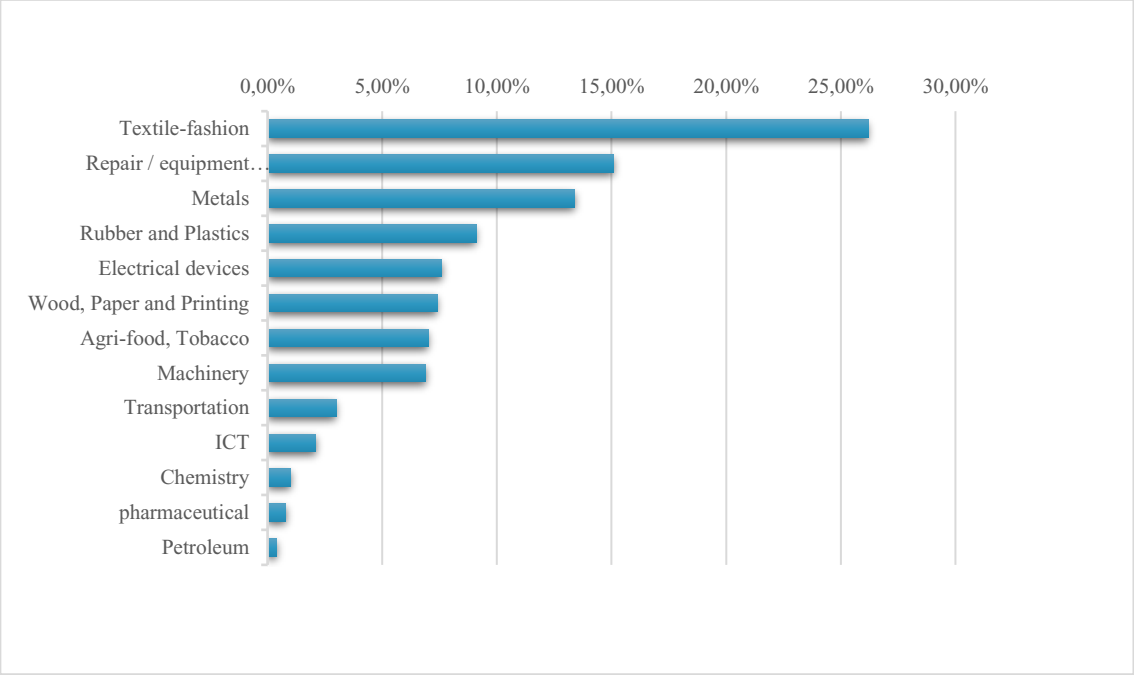



*Fig. 2.2 Employees by sector (Source: Le Marche in cifre, Ufficio Statistica Giugno 2012)*

Since 1990, large production and economies of scales were sufficient to guarantee incomes. Since the 1990 globalization, open market and emergent economies put these economic systems into crisis. In order for companies to be competitive they need to find new solutions, be connected to innovation, new business models, industry 4.0, circular and sustainable manufacturing and the digitalization of manufacturing.

Marche Region is in first place in leather and footwear, with more than 5,000 companies employed in this sector [55]. It is an all-round supply chain, which ranges from the transformation and processing of leather to the study of design, production of footwear, components and accessories in compliance with the most highly technological parameters. One of the winning aspects of this area is the particularly high production specialization; to maintain this competitive advantage, companies must focus on integration.

The Marche Region is one of the most industrialised Italian regions, but it's investment in R&D is still insufficient (Fig. 2.3). The expense in R&D of the total GDP is 0,7% for Marche, in comparison to the 1,3% of Italy.

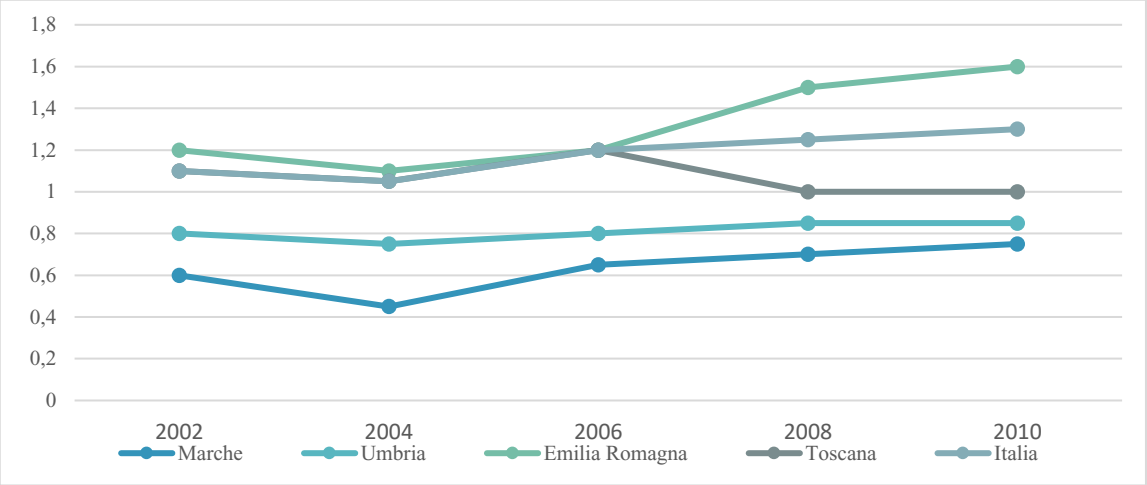



*Fig. 2.3 Investments in R&D (Source: Istat, 2018)*

According to this data, the Marche performance is one of the lowest at a national level. It is in the last category of the European region.

Also in terms of employees in R&D, the Marche Region has a lower value than the Italian ones. In general:

- Marche has 3,3 employees in R&D for every 1000 citizens;
- Italy has 4 employees in R&D for every 1000 citizens.

Few companies invest in R&D and even fewer develop collaboration with Research Centers or Universities.

## 2.3 Empirical Study

Since the intrapreneurship discovery is a completely new approach, and the implication of its scalability on value creation for companies is still a new phenomenon, a survey was created to define the most important factors of the technological innovation processes and analyses of the main target.

The aims of the analyses presented here were first to identify possible companies for testing intrapreneurship discovery and then to provide information on this new methodology.

The first stage of the study involved brainstorming and research to clarify the concept of industry 4.0, the circular economy, and how it would affect companies' growth. Of all the objectives of the wider survey, the research addresses further understanding of the importance of intrapreneurship discovery in industry.

The study design for the survey presented in this research was an online survey administered by means of a web-based self-completion questionnaire.

The survey had 12 different questions, with closed answers, that focused on internal characteristics of companies and on their awareness of business models.

Before listing the questions, a description of the survey was provided to participants. It must also be indicated that more questions were asked for the wider survey. The expected time for completing the questionnaire (wider survey) was between 10 and 15 minutes. Companies who had difficulties filling in the survey have been supported by phone calls.

The survey was carried out in February 2018 through the online instrument LimeSurvey.

The survey studies the degree of knowledge, the needs and expectations of the regional companies and the opportunities offered by industry 4.0 and by circular economy and their capacity to adopt new business models to implement their strategies.

The research focused only on manufacturing companies. According to the European strategy [56], the Marche Region developed in 2014 its Smart Specialisation Strategy (S3); the document was formalized on 5$^{th}$ December 2016 and underlined the main areas in which Marche Region should invest [57].

The European Commission promoted the “Europe 2020 strategy” to create new jobs and guarantee the economic growth of all the European state members [58].

The main objective of the strategy is to guarantee a smart, sustainable and inclusive economy. These three main priorities support the economic development and will guarantee social inclusion, high levels of employment and high performance.

The European strategy asked all regional and national authorities to define the main priorities where they want to invest. According to these priorities, the European Structural Investment Funds (ESIF) will steer the investment.

Thanks to the smart specialisation strategy, the Marche Region identified the unique characteristics and assets of the local actors, by highlighting competitive advantages, and rallying regional stakeholders and resources around an excellence-driven vision of their future. It also means strengthening regional innovation systems, maximizing knowledge flows and spreading the benefits of innovation throughout the entire regional economy.

The regional S3 highlighted the main priorities in which Marche has to improve their business, as reported in Fig. 2.4.

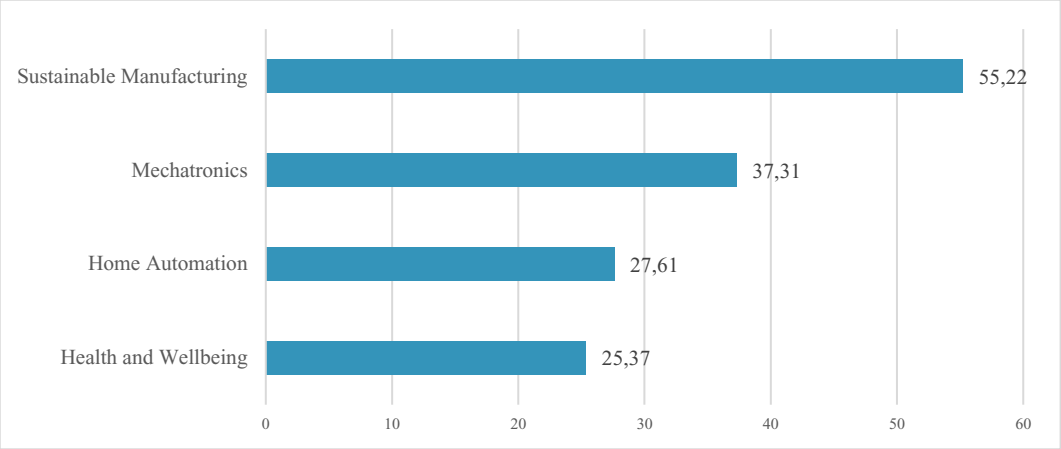



*Fig.2.4 Regional Smart Specialization (Source: Limesurvey)*

The results of the survey identified sustainable manufacturing and mechatronics as the main specialized areas of interest. Companies that work in one of these two priorities are the target of the research. Regarding Sustainable Manufacturing, the main topics are as follow, as mentioned in Table 2.1.

***Table 2-1 Topics S3- Sustainable Manufacturing***

| Topics S3 | % |
|---|---|
| Production technology | 69.23 |
| Energy efficiency | 56.41 |
| Eco-sustainability | 55.15 |
| Integrated design | 38.46 |

Regarding Mechatronics, the main topics are as follow, as mentioned in Table 2.2.

***Table 2.2 Topics S3- Mechatronics***

| Topics S3 | % |
|---|---|
| Systems for the industrial automation | 58.97 |
| Modular and reconfigurable products | 46.15 |
| Smart and eco-sustainable products | 41.03 |
| Robotics systems | 41.03 |

Companies active in one of the two priorities are the target of this research.

## 2.4 Results

This research is based on a survey of 151 manufacturing companies, located in the Marche Region; meaning a response rate of 33% in the face of 420 questionnaires sent to companies.

The survey confirmed the composition of dimension by company:

- 116 small companies
- 21 medium companies
- 14 large companies

The mapping started with the examination of the degree of knowledge of industry 4.0. Companies should give a score, between 0 (not known) and 5 (well known). 43% of interviewed companies answered that they have a medium-low level of knowledge (between 0 and 2) of industry 4.0.

Only 10% of companies, all of which were large companies answered to have very good knowledge of it.

The level of knowledge of industry 4.0 increases with larger companies of the manufacturing sector (Fig. 2.5).

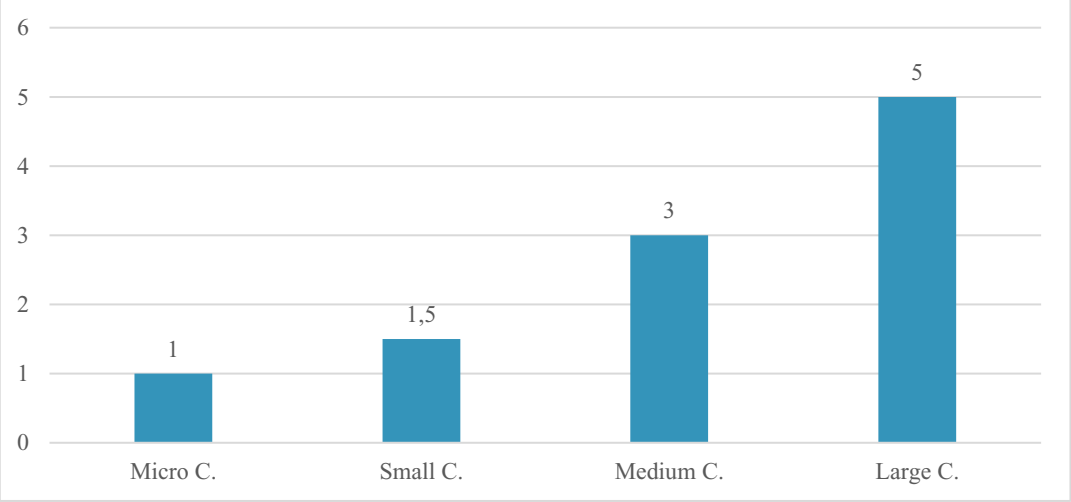



*Fig.2.5 Awareness on industry 4.0 by companies' dimension (Source: Limesurvey)*

The second question was about the degree of knowledge of circular economy. As for industry 4.0, companies should give a score, between 0 (not known) and 5 (well known). 33% of interviewed companies answered that they have a medium-low level of knowledge (between 0 and 2) of circular economy (Fig. 2.6). Only 7% of the interviewed companies know this concept well.

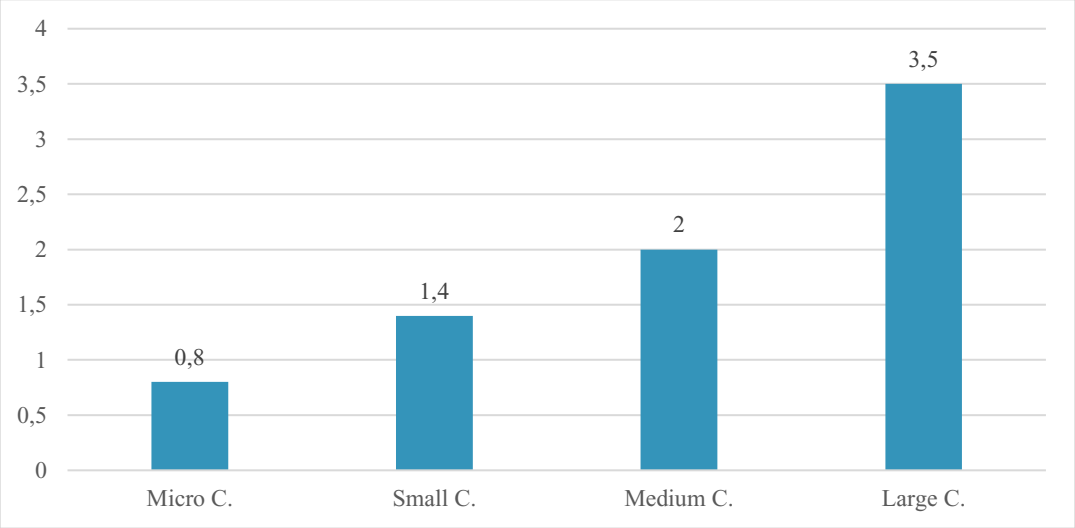



*Fig.2.6 Awareness on circular economy by companies' dimension (Source: Limesurvey)*

As for industry 4.0, the awareness of companies about circular economy increased according to their dimension. Nevertheless, it should also be underlined that in the Marche Region industry 4.0 is more spread than circular economy.

The study continued with a list of technologies in terms of industry 4.0 and the level of knowledge by companies. The study proposed 10 different technologies related to this topic; the most commonly used is Information System Security followed by ICT and Cloud Computing. Additive Manufacturing is the less used and known (Fig. 2.7).

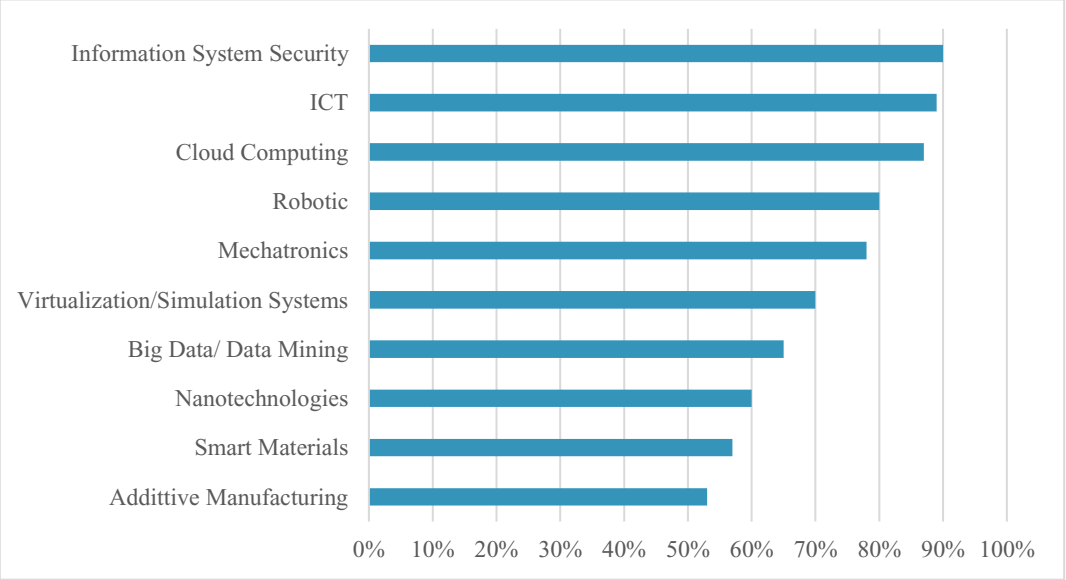



*Fig.2.7 Level of knowledge of technologies applied for I4.0 (Source: Limesurvey)*

For the circular economy the focus was on the definition. Companies had to explain in what sense they could adopt this approach inside their process.

The research demonstrated that for the majority of companies, circular economy is related to the recovery, reuse and recycle of waste, followed by the concept of industrial symbiosis. New social and territorial value is the last concept that companies conferred to circular economy (Fig. 2.8).

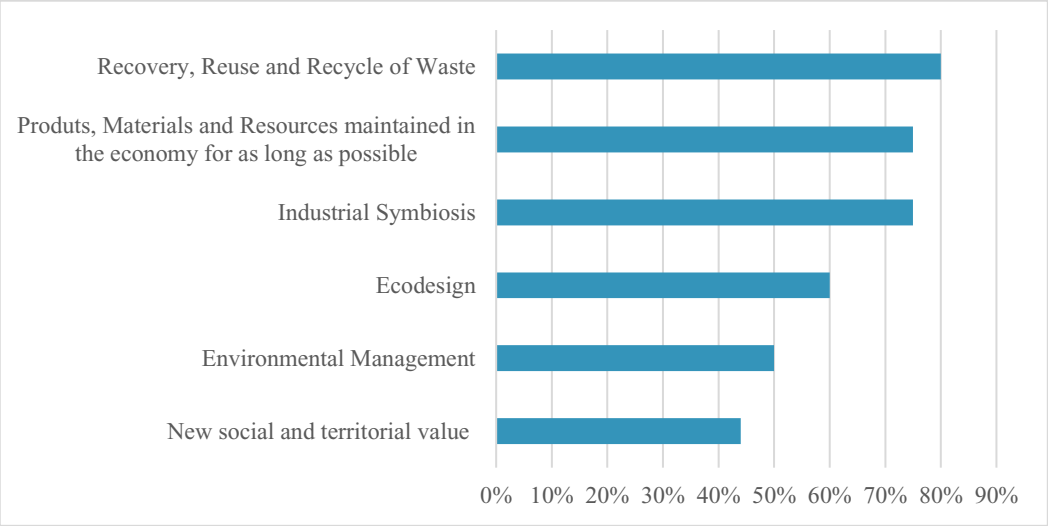



*Fig.2.8 Affirmation related to circular economy (Source: Limesurvey)*

Then, an analysis of the most important factors of the technological innovation processes was done. From this analysis, companies underlined three main factors that influence their economic growth and their need to innovate:

- Globalization of technological development;
- Flexibility and dynamic environment in which companies work and operate, which requires qualified and specialized skills from workers;
- Increasing competition that requires more investment in R&D.

In this field, intrapreneurship discovery is understood as a task, a tool independent from the way that it is performed but essential for testing an idea's value and feasibilities.

Content analysis of the interviewed companies revealed that 65% will raise their competitiveness in the global scenario in the next five years. To reach this goal, the capacities for innovation and sustainability are driven by:

- Information and communication technology (54%);

- Internet of everything- information exchanges and devices more and more interoperable and interconnected (44%);
- Eco- sustainable approaches (40%);
- New jobs skills (39%).

After analysing the key drivers for innovation, companies underlined the main barriers, as reported in Fig. 2.9.

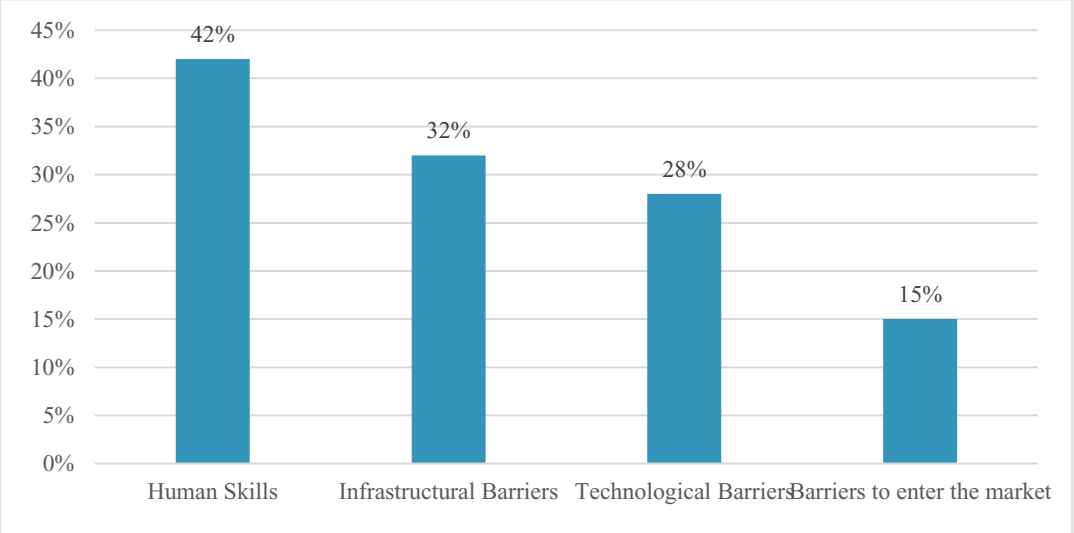



*Fig.2.9 Barriers (Source: Limesurvey)*

The survey underlined that the main problem into guaranteeing innovation and sustainability is the lack of human competences. Often companies received lots of grants to introduce innovative technologies inside their processes, but they do not have the skills or competences to use it.

Infrastructural barriers are not linked to internal factors but are related to the environment and the location where the company are settled; the need of intelligent transport infrastructures such as security roads, intelligent transport systems and connected cities is more and more pressing.

By grouping companies by size class, we can observe that the impact of technological barriers decreases as the enterprise size increases; infrastructural barriers, on the other hand, do not seem to depend on the size class but most likely from their location. In all size classes, over half of businesses believe current human resources skills are a barrier to the company's industrial development plans (Fig. 2.10).

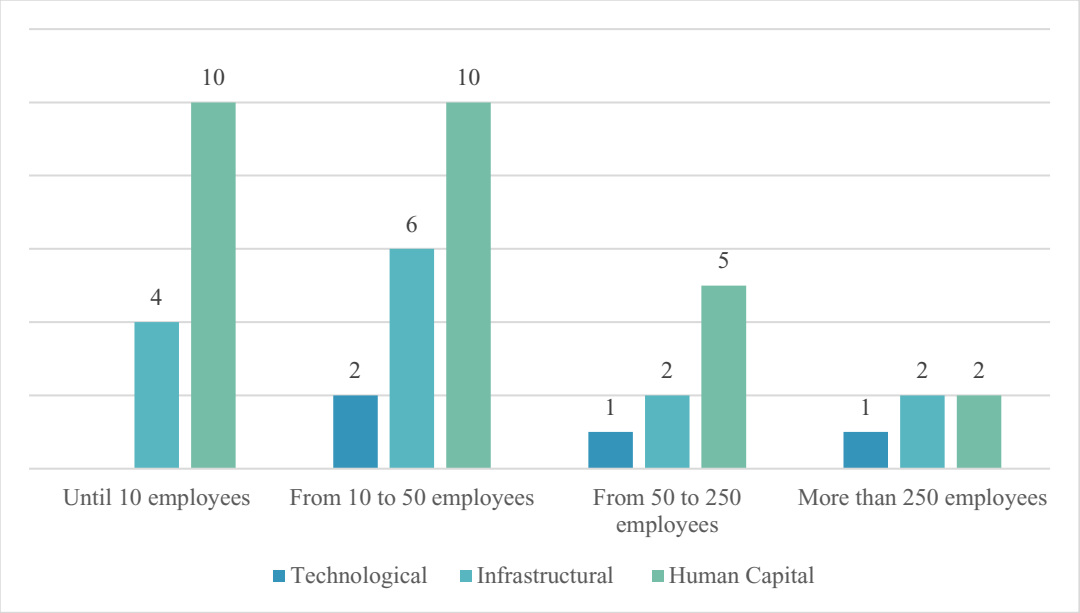



*Fig. 2.10 Barriers according with companies' dimension (Source: Limesurvey)*

The lack of competences is one of the main challenges that regional companies have to face. According to the survey, 10% of companies that completed the questionnaire have no employees with degrees. In 30% of companies 1 out of 5 has a college degree. A quarter of companies have up to 60% of employees with degrees (Fig. 2.11).

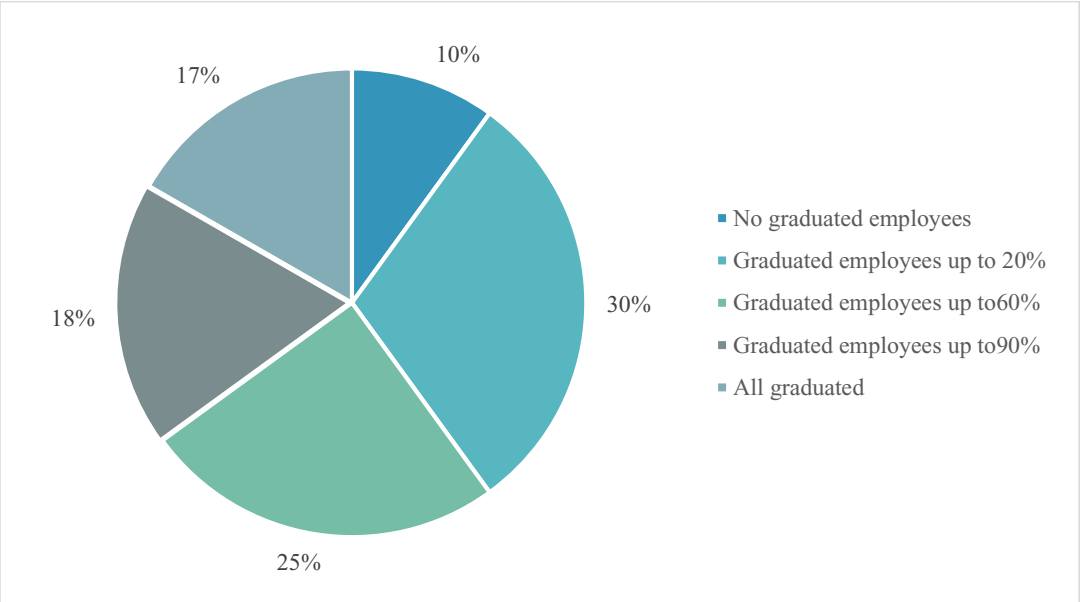



*Fig. 2.11 Education of staff (Source: Limesurvey)*

This problem reflects also the lack of human skills inside companies. The most specialized and smarter companies often have already introduced in their processes new technologies, but they don't have competences to use them.

The Marche Region has to implement its regional smart specialization in order to have qualified experts that can support the use of these technologies.

The region should promote a digitalized, sustainable and innovative ecosystem in which companies can cooperate, boost networking among enterprises, universities and research centres, and guarantee high level of manufacturing production.

According to the results of the survey, the lack of human capital is the biggest challenge companies have to face, followed by the lack of financial resources.

From the empirical studies done in terms of industry 4.0 and circular economy, we can summarize the main aspect in table 2.3.

***Table 2.3- Swot Analysis***

| Strength | Opportunities |
|---|---|
| **1.1** High manufacturing density (22% of GDP compared with 17% in Italy | **2.1** Niche market excellence |
| **1.2** Good dissemination of basic ICT equipment level (PC and Internet connection) in companies | **2.2** Regional funds to invest in industry4.0 technology and in circular economy |
| **1.3** Wide entrepreneurial attitude (16 companies per 1,000 inhabitants) | **2.3** Regional law for industry4.0 development |

### Weaknesses

**3.1** Limited activities in research and development

**3.2** Low level of cooperation between companies regarding the innovation

**3.3** Low allocation level for the use, in micro-enterprises, of ICT

### Threats

**4.1** Partial and/or delayed process of adapting SMEs to new industry 4.0 paradigms

**4.2** Partial and/or delayed process of adapting SMEs to new the circular economy paradigms

**4.3** Difficulty to find a common concept of industry 4.0

**4.4.** Difficulty to find a common concept of circular economy

## 2.5 Conclusion

This empirical study highlighted that in the Marche Region companies know both the concept of industry 4.0 and the circular economy but they have to implement them at a higher level. It is important to define a common path, in order to spread them the same concept. Companies need a structured support in order to identify the best tool according to their needs. In this sense, companies will have the fundamentals for scouting their ideas, and will be able to apply this to regional and national funds.

In this scenario, intrapreneurship discovery can be the key factor in guaranteeing successful innovation strategies within companies. A standard methodology, presented by external experts, will allow for the definition of strengths and weaknesses. It will outline in advance the main risks for companies, and if the innovation has the possibility for economic and long-term sustainability. Companies are encouraged to take risks to think outside the box and move towards a higher degree of externally oriented collaboration for innovative development.

To demonstrate the feasibility of intrapreneurship discovery, the research identified the target to be tested and then this methodology was validated.

From the empirical study, we figured out some quantitative criteria that could guarantee the successful intrapreneurship. Not all companies are in-fact ready for this approach; some of them are still trying to understand the need of this methodology.

The survey demonstrated that companies who achieved some ranking in specific criteria are more ready for this change.

The first criteria that should be considered is investment in R&D. The empirical study demonstrated that only companies that invest at least 5% of their turnover in R&D can successfully face processes of intrapreneurship discovery or are open to adopt this methodology.

They are mature enough to go deeply in innovation processes and understand the new business approach promoted.

The survey also underlined that other important criteria should be taken in account to test the methodology inside companies, as shown in Fig. 2.12.

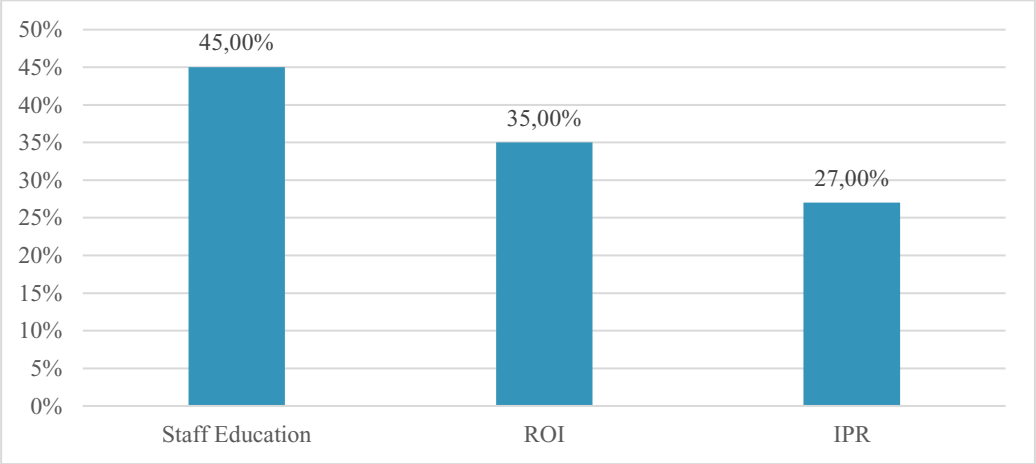



*Fig. 2.12 Quantitative Criteria (Source: Limesurvey)*

The figure demonstrated that only companies with a good number of college graduated employees can easily understand the need for intrapreneurship.

According to survey results, 10% of companies declared that they have no college educated employees in the enterprise. Another important factor that influence intrapreneurship is the Return of Investment (ROI); and then, the intellectual property rights (IPR), that include the number of trademarks, licenses, copyrights, and design or industrial models used to protect the IP.

The activity of mapping was extremely useful to define the main target in which to test the methodology. Hypothetically, all companies could be part of the target.

With this activity, the target was well-defined through specific and measurable criteria. Thanks to the empirical study, three main groups of companies were obtained:

Group 1- companies that already invest in R&D (focus group) and consider innovation a key topic to guarantee their long-term sustainability; group 2- companies that are now

facing innovation (interest group); and group 3 companies that are focusing only on production and view innovation as a plus, rather than a key factor. While companies that belong to group 1 and group 2 in the last three years have increased their turnover or have maintained their market position, companies that belong to group 3 have problems into keeping a competitive advantage.

According to the results, the processes of intrapreneurship discovery in these companies is associated with internal capacities (professionalism of the manager and the recognition of the human capital), and to external capacities related to the application of a standard methodology that allows for the discovery and validation of the idea proposed and to transform it into a new product or service.

In the last decades of the 20$^{th}$ century, according to Rawlings [58], companies have had to deeply modify their strategies. To guarantee economic growth and sustainability in the long term, companies have to use a common methodology, a standard approach to guarantee innovation.

One of the aims of intrapreneurship discovery is to guide companies in their innovation processes; they should take the risk to think outside the box and move towards a higher degree of externally oriented collaboration for innovative development.

The study demonstrated that innovation is not a process that takes place within the boundaries of the company, but it is a process that involves all stakeholders that influence innovation.

According with the Shumpeterian approach [59] the innovation can be in the process, in the product or in the service offered by companies but it can also be recognised in opening new markets or in founding a new way of work inside the organisation. The aim of VTS's is to understand the feasibility of the innovation. From the study of the ideation process, it is possible to understand if there is potential for the idea promoted by the companies or not. VTS's help companies to reduce the risk and uncertainty of new business ventures.

From the empirical study, the following characteristics influence companies' innovation and allow them to be competitive in the global scenario.

First, innovation should be considered a crucial element in increasing revenue and companies should invest in R&D at least more than 5% of the annual turnover to be competitive in the sector.

Second, companies need a structured and organized methodology to really face disruptive innovation. Without a defined approach they get lost and do not achieve the objective.

Third, human capital and a well-organized top management play a key role to organize the innovation process.

Certainly, there is no one universal ì sequence of steps to be adopted, from the generation of an idea, to the final implementation. However, the intrapreneurship discovery allows companies to identify the main stages of the idea, defining a common strategy to validate the idea. For the first time, entrepreneurs can test and validate the idea before investing in it.

# CHAPTER 3
# TESTING ACTIVITY

In this chapter VTS's presented in literature were analysed and classified. Then VTS's were tested inside regional companies.

At the end of each testing activity the results obtained were summarised, underlining the key aspect of each VTS's and when they should be used.

## 3.1 Visual Thinking Strategies

Much of today's revolutionary growth in innovation and entrepreneurship can be directly traced to open innovation's universal appeal and agility in creating a shared global language and intuitive visual mapping.

In this chapter it will be analysed how start-ups, companies or research centres will develop their businesses using business model designs.

Business models can lead to more informed decisions in the context and management of new ventures, as expressed by Harms [60].

According to Castrogiovanni [61], the research demonstrated that during the ideation process, entrepreneurs have to set up the boundaries of the business and define the type of product to be developed.

This task is very complex, especially for companies who are developing a completely new product that requires huge investments in a short period of time.

As explained in chapter 1.3, intrapreneurship discovery is based on VTS's, visual tools for the ideation and validation process.

From the analysis of VTS's, we catalogue VTS's in two main groups:

- Pioneers VTS's [62], as example Business Model Canvas; companies have heard about this VTS and have a knowledge of it;
- Extension of VTS's, they were experimented and created from the study of the pioneers.

*Table 3.1 Classification of Visual Thinking Strategies*

| Pioneers VTS's | Extension of VTS's |
|---|---|
| Business Model Canvas | Value Proposition Canvas<br>Lean Canvas<br>MELT Frame Canvas<br>Business Modelling Tool<br>Venture Design Process |
| RISE Translucent Innovation | Double Diamond Design Process<br>Value Discipline Tools |
| Visual Tool Boxes | Pentagonal problem |

All VTS's offered a systematic execution of continuous design and delivery that help them to focus on the right things at the right time.

In this chapter we highlighted the significance of a business model design as a key task for the company to evaluate a new idea or proposal.

The results of our research confirmed that VTS's, used as an independent variable, are related to company's performance.

In the following chapter we reported some testing activities done during the research. We applied **9 different VTS's in 42** companies with different dimensions, all located in the Marche Region.

During the research, we decided to not test the Visual Tool Boxes [63] and the Pentagonal Problem [64]. According to intrapreneurship discovery, these tools are very simple to use, and they don't really have an added value in terms of open innovation. They are usually used inside schools, helping students to work in teams and understand innovation. Teachers presented these tools to help students identify a problem and its different components and details.

To guarantee intrapreneurship discovery, this methodology should always be accompanied by other tools to be effective. They allow companies to better understand the challenges they have to face, but they don't go in detail about the description of the challenge, the key resources or the stakeholders involved.

Our testing activities started with the most common one, Business Model Canvas and then we pass to its extensions.

## 3.2 Pioneers VTS's

To support the creation of highly complex ventures that deal with fragile and complex technologies, new tools for creating, testing and validating ideas have been developed.
The activity of testing started inside the pioneers VTS's, Business Model Canvas and Translucent Innovation.

### 3.2.1 Business Model Canvas

One of these is the Business Model Canvas Canvas (BMC), developed by Alexander Ostewalder in 2004 [65], as a doctoral dissertation on business model innovation, revolutionized how people approached and engaged in enterprise development. Ostewalder, a student at Switzerland's HEC Lausanne, worked with professor Yves Pignor to bring this model to the world.
BMC is a conceptual instrument that helps companies in their decision processes, making the right decisions at the right time. In a very simplified and intuitive scheme, BMC contains objects, concepts, and relationships that are the main aspects to be considered in order to do business.
The BMC is divided in 9 different segments.
Each block allows project development: 1) customer segments, 2) value propositions, 3) channels, 4) customer relationships, 5) revenue streams, 6) key resources, 7) key activities, 8) key partnerships, and 9) costs structures. Each segment contains a set of questions that help companies to validate the model.
To facilitate the understanding and the use of the model, the nine blocks can be grouped in the area of ontology into four different sections: product, customers, infrastructure and finance.
Block 2) value propositions, is about products and describing the added value of the idea proposed. Blocks 1) customer segment, block 3) channels and block 4) customer relationships are related to the customers: definition and engagement of the target, the demands, how can we reach the customer and how the customer perceives the value delivered, and which type of relationship the company need to establish to reach and maintain the customer segment.
For what concerns infrastructure, block 6) key resources, block 7) key activities and block 8) key partnerships, are related to the logistics and production, focusing on the relationship

between key partners, such as employees, suppliers or partners and the company. In the end, finance, relates to block 5) revenue streams and block 9) costs structures, to collect information regarding the financial sustainability of the company.
The model is created to help individuals and groups develop strategies, plans and to make decisions around the different elements of a business.

The BMC is a roadmap for all businesses. Companies can pick up their ideas and begin exploring a product or service from any place on the map. The starting point is the value proposition, where companies define the added value of their ideas. Then, customers should be defined [66]:

- customer segment to identify which customers the company tries to serve;
- customer relationship to define the relationship the company wants to establish with the segment;
- channel to outline the type of channel company will use to reach the customer segment.

Then the business model tries to figure out the financial part: costs, where the company tries to explore all the costs to be considered for transforming the ideas into a prototype, and revenues such as the income companies can make from the customer segment already identified.
The research is based on two case studies of two companies set up in the Marche Region. Both entrepreneurs of the two companies chose BMC to understand the potential effect of their ideas on their processes.
The choice was not casual, but after a careful evaluation, they thought that BMC was the tool more adapted to guide them in the validation process.
The two companies are:

- a small company set up in Fano, Marche Region, Italy, working in the manufacturing sector, as a producer of blades;
- a large company set up in Gradara, Marche Region, Italy, working in the mechatronic sector, as a producer of electro-spindles.

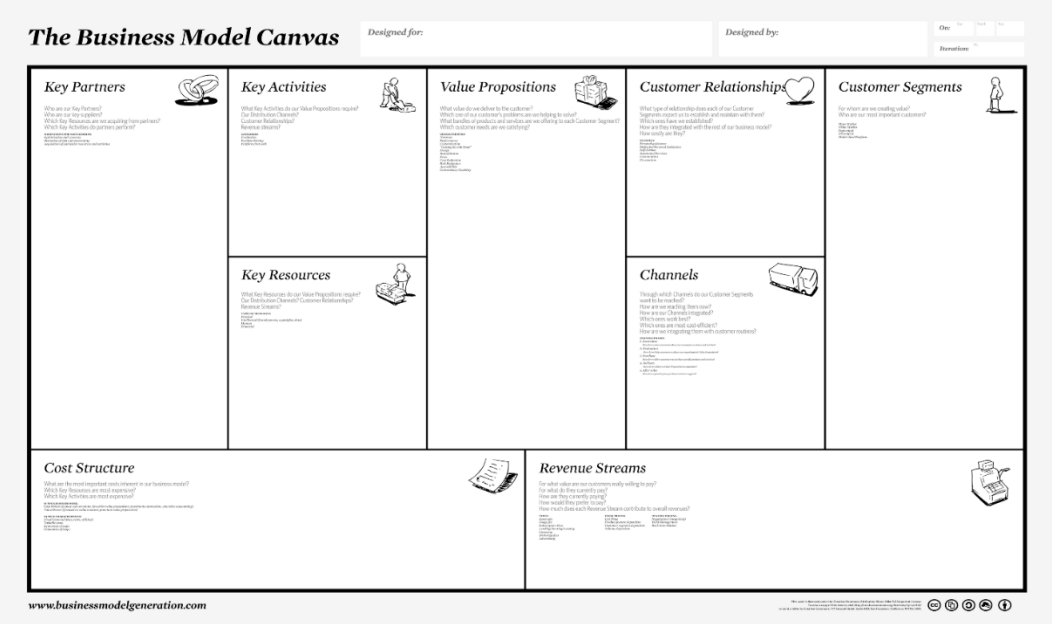



*Fig. 3.1 Business Model Canvas*

According to companies that participate in the testing activity, we decided to not mention their names. We list all of them in the annex and we also give their website, but they prefer to not be associated to the VTS's used. In the research, the companies are mentioned with a capital letter, such as Company A, or Company B and so on.

The testing activity started with Company A, the leader in Italy is wind blades design, development and manufacturing. It is a manufacturing limited responsibility company (s.r.l.), with a facility of about 5.500 m2 covered space and 3.000 m2 outside space, founded in 2011. Its registered office is in Livorno (Italy) and its production site is in Fano (Italy).

The vision of Company A is to be able to achieve:

- more from less windy sites while maintaining high efficiency under conditions of strong wind;
- significantly improving of the output from old wind-farms providing longer life-cycle;
- loads reduction on blade, gearbox and tower under any wind condition through the adoption of advanced manufacturing techniques and design methods embedding self-adjusting bend-twist and passive deforming

- the ability to seamlessly support our clients from start to end, from designing a new blade suitable for their original equipment and site conditions, through to authorization procedures and investment decisions

The BMC helped the company have a visual map of its business idea and to undercover all the aspects to be consider in order to develop a new business (Fig. 3.2).

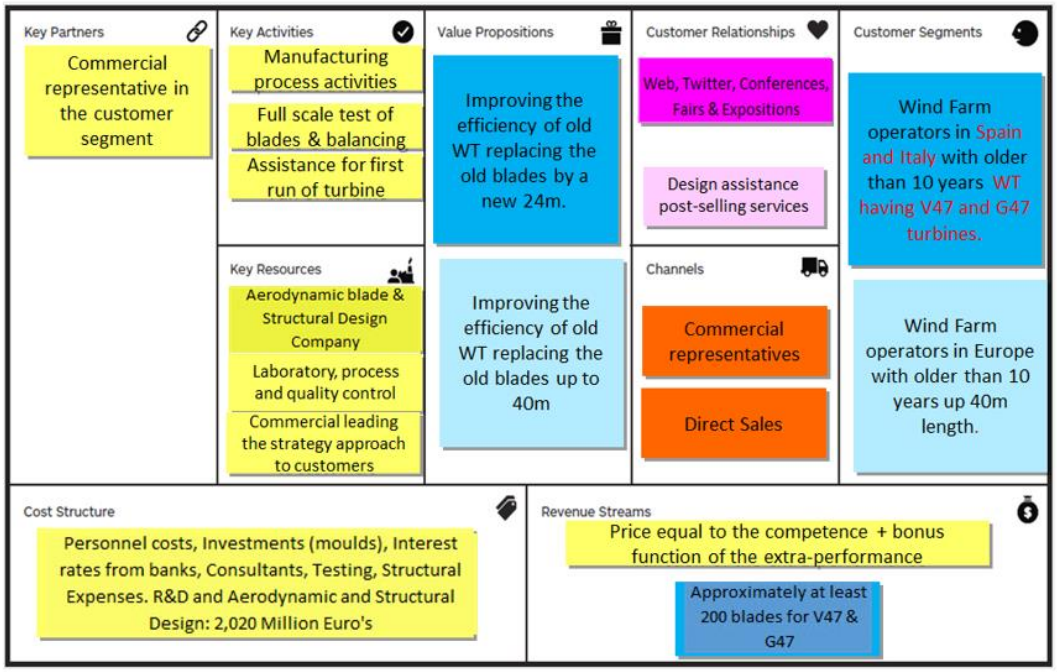



*Fig. 3.2 Business Model Canvas Company A*

Through the support of the BMC, Company A defined the key milestones of its idea, such as:

- Identification of the key target market and customer segment: Italy and Spain;
- Operators who possess WT (wind blades 24 m long), 10 years old or more, foreseeing the very concrete possibility of opening up to the whole European market producing new blades for every wind farm operator with WT older than 10 years featuring blades up to 40 m long;
- Assessment of the market size, that is to say the number of potentials replacing old blades;

- Early field trials of the pre-prototype blade in relevant environment (a real wind turbine of a potential customer) that are now under way with first over performance results more than 20%;
- Estimation of return on investment (ROI) based on efficiency results within 4 years, considering a total investment of 150,000 € for the re-blading process;
- Selection of key partners for the furniture of eco-friendly materials for blade production but also for the definition of the all value chain;
- Channels to reach the market.

As reported in BMC in the section **value proposition**, the idea of the company was to implement and produce a universal aeroelastic wind blade, which is recyclable, highly efficient and able to operate in both high and low wind regimes, called MEWi-B (More Efficient Wind Blades).

Thanks to the use of BMC, Company A defined the concept and the approach to be used to implement the wind blades, called MEWi-B. The innovative universal aeroelastic blades of MEWi-B will be able to produce power at lower cost per kWh than those installed on traditional wind turbine rotors thus significantly contributing to closing the gap between wind and traditional energy, reinvigorating the asset of old wind farms and the pace of off-grid installation in rural areas, contributing to developing the distributed generation market. Through the use of BMC, Company A can underline its value proposition. The added value and innovative qualities of MEWi-B compared to what is currently deemed 'state of the art' is summarised in the following features:

- *Auto-adaption*: The unique aerodynamic design based on special aeroelastic models specifically developed by Company Ain partnership with The Energy Research Centre of the Netherlands and Milan Polytechnic University. The blade is able to deform itself constantly, adapting its profile to every wind condition. This feature allows the blade to be able to rotate in low-wind conditions, assuring better performance even in high-wind conditions. To date there is no known technology like this in the World. A European Patent application is foreseen for this innovation to protect the design of the aerodynamic profile.
- *Stiffness and weight reduction*: the use of advanced materials such as carbon, Kevlar and honeycomb, will allow the blade to reach a high level of stiffness. This

will guarantee optimal performance for the aerodynamic profile at all wind speeds, while the lightness will help in reducing the cut-in and increase yield.

- *Technology transfer:* to design and produce the blades, Aerospace and Naval production technologies will be adopted. In particular, blades will be produced inside carbon moulds, already heated to permit the polymerisation of resins of composite materials. The blades will be realized with infusion technologies to ensure high quality, a very low degree of defectiveness and optimum weight reduction.
- *Coating*: on the surface of the blade, Nanotechnology-based functionalising coatings will be applied. These coatings will augment surface hardness, reduce drag and grant a better resistance to weather conditions reducing maintenance and refitting. It is planned to register a utility model of MEWi-B innovative coatings.

Through the BMC, Company A identified the novelty of the solution proposed; it will allow for the achievement, (through re-blading programmes) of greater efficiency even during low wind speed conditions while maintaining high efficiency under conditions of greater wind. All at a remarkable cost reduction ratio ("LCOE" or €/kW) for new wind turbines, with the aim of improving wind farm returns.

Customers will benefit from enhancing the energy production of their power plants and longer lifecycle with a payback period on the investment related to re-blading of less than 4 years on average.

BMC allowed for the identification of the most relevant **customer segment** for the initial introduction of new solutions for the Italian and Spanish wind farms with blades at least 10 years old - V47 or G47 WT. The BMC suggested establishing a long **customer relationship**; the solutions proposed are online channels such as web, social networks (Twitter and Linkedin) and also physical participation in fairs and expositions. The aim here is to establish trust and to create loyalty around the solution proposed. To reach this last objective, BMC underlined also the opportunity to offer service post- selling.

BMC also focused on two main distribution and selling **channels**:

- Direct - Through the already existing network;
- Indirect - Establishing a solid partnership with selected intermediaries, such as EREDA and Weir (Spain).

In Spain, where the majority of the potential market has been identified, Company A will strengthen its commercial presence through selected partnerships. In terms of **key**

**partners,** Company A should look for commercial representative in the customer segment, which will help sell the product.
With concern to **key activities,** the BMC described all the methodologies that should be implemented during the project:

- Industrial scaling up of the prototype;
- Final product manufacturing;
- Calibration of the final product;
- Certification of the final product for market replication;
- Design of commercial plan and commercial net.

In terms of **key resources,** they are related to the key activities, so a company has to look for a laboratory to test and verify the quality control; all the resources related to the commercialisation strategy and some research centres who could do the design of the aerodynamic blade.
All the main aspects of the innovative product Mewi-B can be defined through the BMC; it helps Company A to define the strategy for reaching the market.

In this section we also reported the use case of Company B, a young and dynamic company located in the heart of the Pesaro furniture district, an area that has always been characterized by mechanical companies of world-wide excellence that have diversified their activities in different directions over time.
The passion for mechanics combined with a strong focus on customer satisfaction have made Company B a world-leading company in the production of electrospindles, 5-axis heads, bevel gearboxes and CNC drilling units for wood, aluminum and marble processing, glass and PVC, with a solid experience in electronic components that today merge with mechanical ones, thus giving life to the company "Mechatronics".
Company B has been a lean company since its foundation; the dedication to customer satisfaction sustained and sustains a solid growth oriented and focused on the added value that Company B can supply to his customers products.
The current product portfolio includes: electrospindles, boring units, aggregates, brushless servomotors, rotors/stators, and two-axis heads.

Company B aims to launch a new product in the market, called TORQUE, but before it made this decision, it decided to use BMC to verify opportunities and risks for the solution reported in Fig. 3.3.

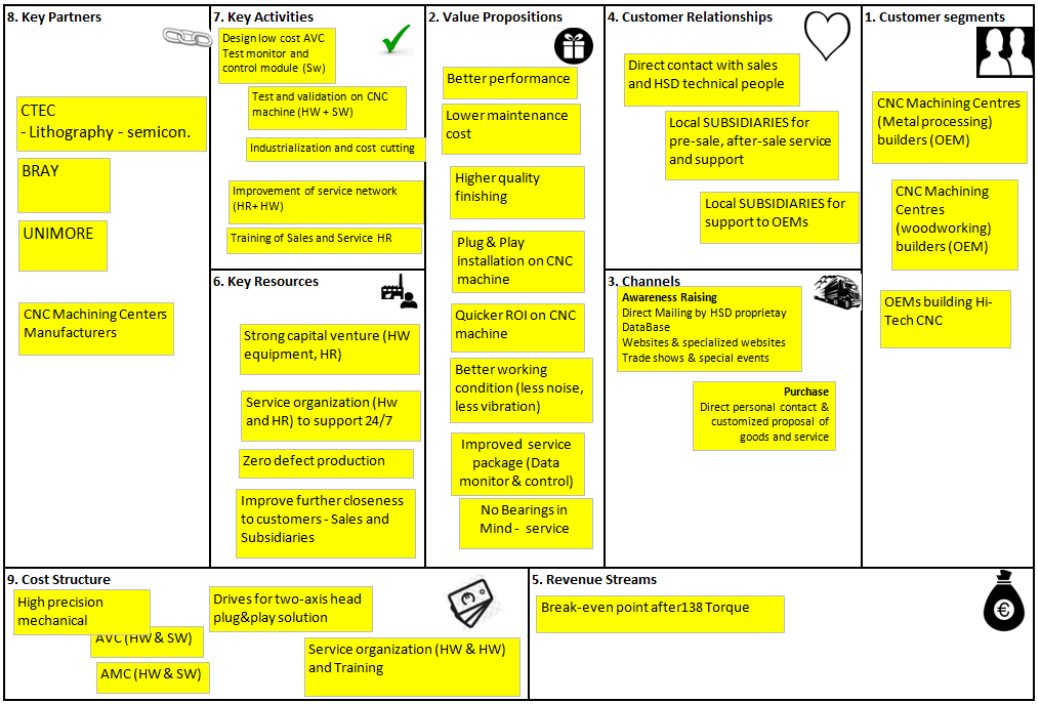



*Fig. 3.3 Business Model Canvas Company B*

Through the BMC, Company B recognized key milestones of its proposal, such as:

- Target market: B2B niche market;
- Estimation of ROI, +3% plus the income in the next 3 years;
- Value Proposition: Faster Processing Capacity matching high-quality finish; Plug&Play feature; Higher reliability & Smart data management capability;
- Customer segment: CNC and OEMs;
- Key partners necessary to define the value chain;
- Partnership already active to sell the product;
- Definition of the key activities in order to realize the prototype: design of the two-axis, choice of core components, verified that the project matches Design-to-service and Design-to-production criteria; pre-assembly-kit design; prototype assembly and test.

Company B used BMC to define the **value proposition** of the product called TORQUE, an innovative, high-performance and adaptive two-axis head to be installed in CNC Machining Centres (CNC M/C) for metal, plastic and wood processing.

Through BMC Company B the main features of TORQUE were identified:

- it provides high-quality and high-sustainable manufacturing;
- it aims to overcome the limits of current two-axis heads by integrating advanced technological solutions for energy-efficiency, Adaptive Motion Control (AMC), and Active Vibration Control (AVC).

The value proposition of TORQUE is based on:

- *reliability*: TORQUE drastically cuts down the system moving parts (gears, gear box, pulleys etc.) and consequently eliminates backlash, wear out and breakage over time, increasing reliability and reducing maintenance;
- *flexibility*: TORQUE is based on modular and scalable system architecture. Each module (sized according to application) covers specific functions, and can be easily scaled and configured (i.e. speed, precision) according to specific OEMs requirements to be suitable for different applications;
- *adaptability*: TORQUE can be used in several industrial sectors and on different type of CNC M/C because simple modifications (without acting on the hardware) may adjust features and performance according to QEMs needs.

The BMC figured out the target market relevant to the TORQUE product, a B2B niche market characterized by a few suppliers and a small global sales volume

The main markets of TORQUE can be identified in Europe (Italy, Germany and France), Far East (China, Taiwan and South Korea), and America (USA).

The BMC supports Company B in the approach definition; BMC aims to exploit the advantages offered by torque and the partner to involve. The core of TORQUE products will include: two direct-drive motors, advanced sensors, a closed-loop control, an active vibration control system (AVC) to dampen system vibration, and an adaptive motion control system (AMC) thanks to a set of motion optimization algorithms.

BMC highlighted the **customer segment** represented by a set of material processing on 5-axis CNC M/C, referring to several applications: aerospace, automotive, general mechanical application, furniture, windows and doors, new energy, Hi-Tech for consumers. It is worthwhile it to consider that usually the application requirements (in terms of feasibility, speed, precision) have to be satisfied by the two-axis head, as it is the main

entity responsible for the 5-axis machine performance. According to BMC, customer segment should be reached by two main distribution and selling **channels**:

- direct mail;
- direct phone call and direct contacts already available due to the pluriannual experience in this sector.

In terms of **customer relationship,** BMC proposed direct contact with sales and also local subsidiaries in place that will support customers and sales. Subsidiaries will create loyalty around the solution proposed and will establish a long and durable relationship with customers.

Through BMC it was possible to recognise **key partners** such as manufacturers of: two-axis head and CNC M/Cs + End User of CNC M/Cs. Each partner will improve its innovation capacity, expand their current product portfolio, access new markets, and acquire new knowledge.

In terms of **key activities**, Company B will achieve specific methodology, concerning:

- Pre-industrial development, market needs and industrial scenario investigation;
- Main modules development;
- TORQUE modules prototype and testing;
- Final product development;
- Commercial plan.

According to BMC, in terms of **revenues** TORQUE products will outcompete the current products by increasing performance without increasing price (with a strong possibility to reduce price). The improved performance, features and reduced operating cost will enable TORQUE to challenge the 'self-built' two-axis heads market and reach the breakeven point after 2 years.

In the section of testing we reported only two case studies, but this activity was done in **20** companies. Thanks to its versatility and flexibility, BMC could be applied to different companies with different dimensions. In table 3.2 we clustered companies and we analysed results achieved.

*Table 3.2 Classification of companies BMC*

| |
|---|
| DIMENSION |
| • 13 small companies<br>• 4 medium companies<br>• 3 large companies |
| TYPE OF SOLUTIONS |
| • 16 new products<br>• 4 new services |
| TYPE OF COMPANIES |
| • 5 made in italy<br>• 3 automotive<br>• 5 electronics<br>• 2 reneweable energy<br>• 1 construction<br>• 4 mechatronics and machine constructions |
| % OF INVESTMENT IN R&D |
| • 12 more than 6% of the annual turnover<br>• 6 more than 5%<br>• 2 less than 5% |

From table 3.2 we could underline that BMC can be applied to companies that work in different fields, but is also open to investing in R&D. For the characteristics of the regional environment, the number of applications of BMC is higher in small companies, but according to the empirical study already discussed in chapter 2, this is not surprising.

BMC helped businesses to solve problems related to a new product, rather than to a new service; as said in the previous chapter, the focus of our research is manufacturing firms, and obviously they produce manufacturing products, they do not offer services.

The research underlined that BMC is essential for intrapreneurship discovery. It helps entrepreneurs in several ways. At first, it allows entrepreneurs to reflect on their businesses, developing a model with a graphical tool where all elements are related each other in a coherent and effective way.

Second, it's useful to explain to all the organisations how to articulate the business and what main actors are necessary for the development of solutions. Thanks to this format companies can start a dialogue with different stakeholders, such as customers or employees and can think of how to reach this target, underlining possible risks and failures. Third,

entrepreneurs start to consider all the elements that influence their business as a whole and not anymore as a single task. This is crucial because entrepreneurs are not used to thinking in terms of the general vision but usually they focus on a single element.
Last, BMC forces companies to think beyond the product, understanding the target's needs and type of resources needed.
BMC becomes more and more popular and useful among entrepreneurs and during the years, different researchers improve this methodology and do some variations to encourage intrapreneurship discovery process.

### 3.2.2 Translucent Innovation

One of the methods used for the intrapreneurship management is the translucent innovation. Translucent innovation is a platform for Open Innovation developed by RISE, the Research Institutes of Sweden [67].
There are many different forms of Open Innovation. Translucent Innovation is a form based on *Request for Proposals* (RfP), and works a little bit like a number of well-known Open Innovation Service Supplier platforms.
To start the process, the company has to describe its problem in a RfP. It is a form structured in 5 parts to be completed by the company.
In this format the company has to explain the kind of solutions it wants to complete, as well as the technical specifications and partnership the company wants to establish.
At first, the company fills out the RfP and then sends it to the moderator who will carefully read the RfP and will fix a meeting with the company to better understand the concept.
We applied this VTS to three different companies, Company C, Company D and Company E.

The first use case studied is Company C, a small company that works in the laminate metal market from more than 40 years. It offers a wide range of products for architecture and in particular for facade cladding.
Company C is a small company set up in the Marche Region, Osimo, (AN). It has 40 years of experience in the field of aluminium and steel sheets. They are specialised in the production and supply of machined, stamping and flatting sheet materials.
The company has within all the machines that are indispensable to work sheets. Bending machines, rolling machines milling machines etc. All these machines are customized for

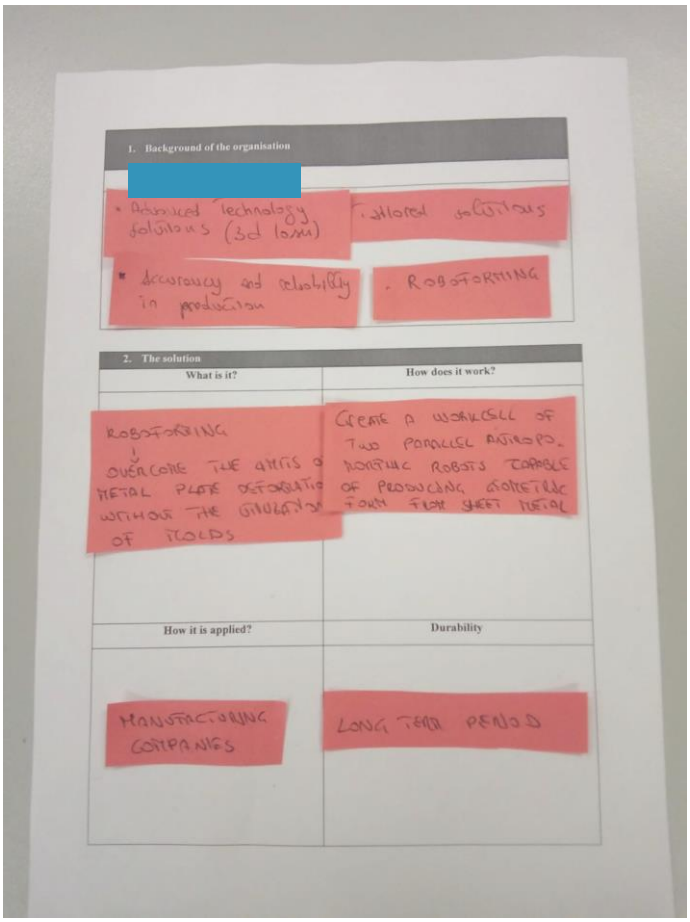
Company C: working dimensions, technical specification etc. Internal skills let Company C work every kind of aluminium and every thickness from 0.5mm to 10mm. The employees let the company win all the challenges that the company exceeds every day.

Company C has engineers with more than 10 years' experience in CAECADCAM system. People with more than 30 years of experience working aluminium and steel materials.

Today it sets out as a partner for the supply of a very wide range of metal materials designed to the architecture and in particular for facade cladding and complex geometries such as Trenitalia spa, Focchi spa, CIESSE spa and other SME's end-user.

In 2015 Company C approved the increase of social capital from 23.400,00 € to 900.000,00 €. This result represents an important societal choice, considering last year's successes. The aim is to give an important sign of solidity, competitiveness and long-term quality.

Company C used translucent innovation to solve a technical problem: the impossibility to deform metal plates without the utilisation of molds.



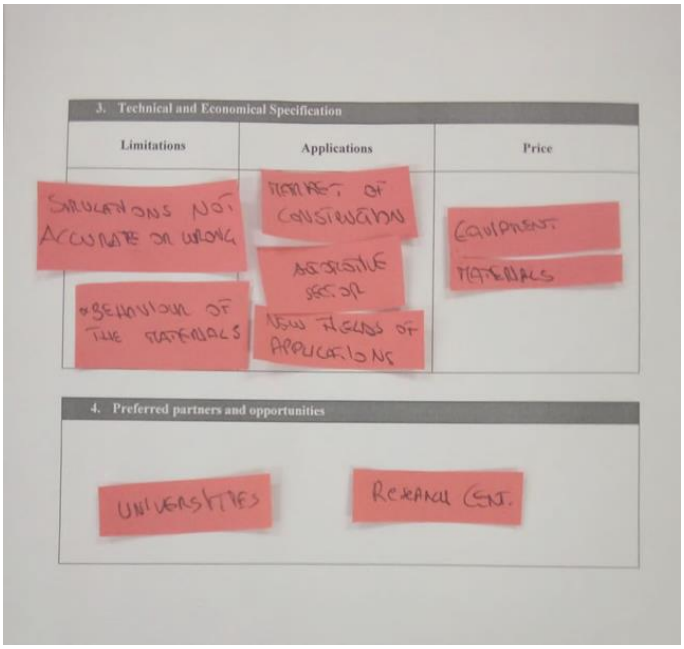



*Fig. 3.4 Translucent Innovation Company C*

Though Translucent Innovation, Company C put forwards a project proposal to develop a new technology called roboforming.

Through Translucent Innovation Company C found out how to create a work cell consisting of two parallel facing anthropomorphic robots that are capable of producing any type of geometric form from sheet metal, with varying thicknesses without the use of molds.

Translucent Innovation allowed Company C to identify the main features of this work cell, that basically should combine the flexibility of a robotic work cell and a technology called "incremental forming". This technology provides a plastic deformation through the application of small incremental deformations. By using two parallel facing robots this would allow the material into be deformed at precise points, replicating what currently occurs between a matrix and the punch of a mold.

According to this VTS, the solution can be applied to big variety of products, in different shape and dimension, saving costs and materials.

The VTS provides information on the feasibility of the solution, highlights the main aspects of the solution, how it should work, what the possible applications are in the market, as well as the main sectors and targets.

Thanks to this VTS, Company C underlined the most important **limitations** to deal with:

- difficulties in finding the right software to purchase that will collect data without errors;

- simulations (CAD, FEM…) output are wrong and not accurate;
- the behaviour of the materials that will conduct to an incorrect point of deformation.

The key market of **applications** is the market of complex geometries construction, improving the performance and rising the market share about 20%; the automotive market, implementing the customized production instead of mass production; and new robotic applications in the field of cobots (cooperative robots).

Translucent Innovation also establishes **costs** that are related to:

- equipment needed for the implementation of all the project tasks such as tools, small milling machine, personal computers, software CAM, PLC components, electronical components;
- materials such as aluminium sheets, steel, lubricates, oils, mechanical parts.

Translucent Innovation also points out the need of **key partners** such as universities that will be in charge of the testing of the materials and on the behaviours of such materials in complex environment.

The second use case is about Company D, a large company leader in manufacturing of turned parts and high precision mechanical components, covering several industries sectors such as automotive, valves, hydraulic and pneumatic.

Company D used Translucent Innovation to try to reduce time and guarantee high standard quality in the measuring machine sector.

The quality control process of the single components actually is done by operators and often the process becomes a bottleneck of the whole manufacturing process, offering only partial reliability because of human error risk.

Company D is an Italian company producing high precision turned metal components founded in 1963, located in Castelfidardo (AN). Currently the market of the company is represented by the biggest European and American players in several industrial sectors with a special focus on the automotive market (components for systems of security, fuel, conditioning, mechanic transmission, etc.).

In the RfP Company D proposed the CoM3 solution: a breakthrough innovation into the measuring machine sector mainly referring to the innovative concept of concurrently measurement including an innovative optical solution for detection of residual machining burrs.

The objective of Translucent Innovation is to highlight the main characteristics of COM3, defining limits and barriers as to how to solve the technical problem.

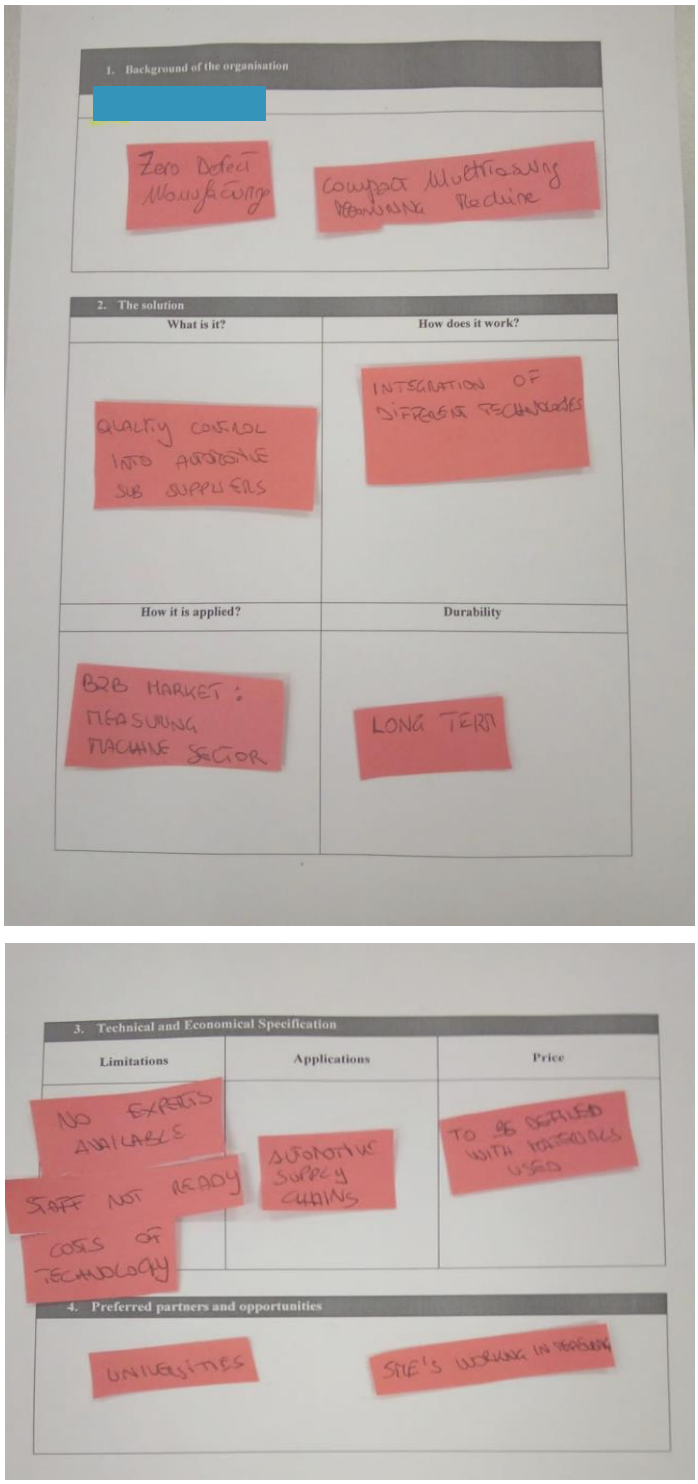



*Fig. 3.5 Translucent Innovation Company D*

Through the use of Translucent Innovation, Company D defined the novelty of the solution proposed, a Compact Multitasking Measuring Machine for bench use, intended for quality control into automotive sub suppliers of metal components with a particular focus on high precision turned metal components.
The prototype will integrate different optical technologies (artificial vision systems with both linear cameras and matrix cameras, etc.) together with already standardized contact measure control systems, practically merging complementary and different technologies that in actual market panorama are only partially available and just in form of standalone control machines.

Translucent Innovation demonstrated that CoM3 machines will provide a unique workpiece positioning apparatus, interchangeable and easy to setup, allowing for the inspection of the metal component from different sides by means of the integrated optical and contact measure control systems. It also optimises data management: the results of internal and external dimensional characteristics as well as optical check results. These refer to functional features like residual machining burrs that will be stored and statistically managed, allowing for the implementation in both the final check and statistical process control (SPC).
The possible **applications** are all companies working in the automotive supply chains.
Regarding **costs**, Translucent Innovation demonstrated that the relationship between the costs and materials can change accordingly.
The **limitations** of COM3 underlined by Translucent Innovation are:

- staff not ready to use this technology;
- difficulties in finding experts that can manage the products;
- costs of the technology.

Possible **key partners** are universities and SMEs working in the measuring sector.

The third application of Translucent Innovation was in Company E, an innovative start up specialising in the design and development of innovative software solutions and services.
Company E is a software house developing and selling software solutions to support the product development process. It was born six years ago as a spin-off of the Polytechnic University of Marche, Department of Industrial Engineering and Mathematical Sciences. It is currently an innovative start up made up of 20 employees, almost all of them with a master's degree or PhD. The last turnover amount available is €217.663,00 for 2015.

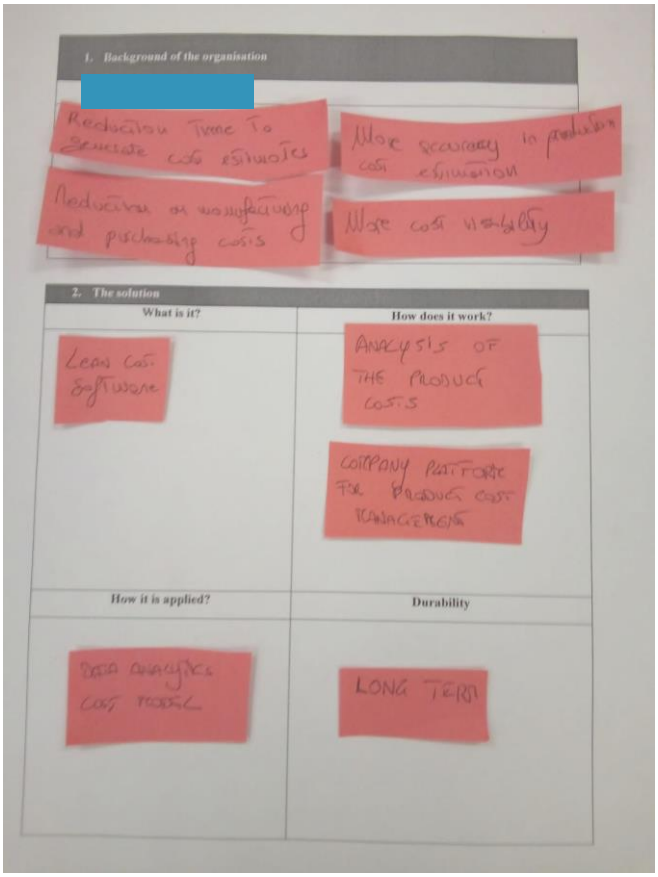
The company supplies some of the biggest industrial groups that belong to the machinery, automation, automotive, plant design, oil&gas and aviation industries.

Company E comprehensive service offerings allow companies to optimize cost management with the support of a specialized staff.

They offer innovative software solutions to support the product development cycle and to better manage the company's know-how. The solutions aim at simplifying processes to reduce time to market and guarantee the highest product quality.

The problem Company E has to face is not related to the company itself but to its customers; companies do not have an effective information exchange between the key figures involved and the user interfaces.

The instrument used to manage information is called LeanCOST: a platform for product cost and time management.



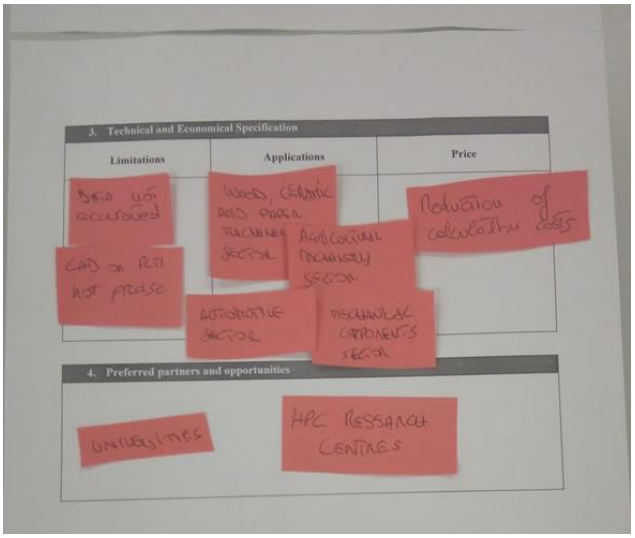



*Fig. 3.6 Translucent Innovation Company E*

Translucent Innovation was adopted by Company E to define the priorities of LeanCOST, the sectors and the main target. It also supports the company in the identification of all the advantages of the solutions, the main applications and the possible costs.

Translucent Innovation discovered that LeanCOST replied to need of companies to simplify and speeds up the estimation of manufacturing times and costs from the earliest design stages.

It enables an effective information exchange between the key figures involved by deploying a set of tailored user interfaces. Indeed, each figure can analyse the product costs with a different level of detail and use the system features to efficiently and fully support its work. Thanks to the control on each production stage through geometric and technological parameters.

The added value of LeanCOST is that it enables an effective information exchange between the key figures involved by using a set of tailored user interfaces. Indeed, each figure can analyze the product costs with a different level of detail and use the system features to efficiently and fully support its work. Thanks to the control on each production stage through geometric and technological parameters.

Thanks to its flexibility and adaptability, LeanCOST **applications** are different: form wood, ceramic and paper machine sector, to agriculture sector, but also automotive or mechanical component sector.

Through Translucent Innovation, Company E identified the main **limitations** of the solution to be:

- Difficulties in finding the right software tools that will collect manufacturing data without errors;
- The cross analysis of data collected through different systems, ex. CAD or PLM or ERP will be not precise and it's not possible to develop an analytic manufacturing cost model;
- The data collected is not accurate and the determination of the cost breakdown is wrong.

In terms of **costs**, Translucent Innovation figured out that the model will guarantee a reduction of calculation costs up to 85%. It also will raise the productivity of the users up to 40%. The main sectors of application highlighted by Translucent Innovation are the mechanical components sector, the automotive sector, the agricultural machinery sector, the wood, ceramic and paper machinery sector.
This VTS also points out the need of **key partners** such as universities or Research Centers specialised in HPC.

In this section, we reported only 3 use-cases, but we tested Translucent Innovation inside **10** companies, set up in Marche Region. We clustered the reached target in table 3.3.

***Table 3.3 Classification of companies Translucent Innovation***

| DIMENSION |
|---|
| • 5 large companies<br>• 4 medium companies<br>• 1 start up |
| **TYPE OF SOLUTIONS** |
| • 10 new products |
| **TYPE OF COMPANIES** |
| • 2 ICT<br>• 2 energy industry<br>• 6 mechatronics and machine constructions |
| **% OF INVESTMENT IN R&D** |
| • 8 more than 6% of the annual turnover<br>• 2 more than 5% |

Compared to all other VTS's, Translucent Innovation should be used to satisfy a technical problem or a technical need. This way this VTS will be tested only in companies that produce products and have to solve a technical challenge or a technical need of the product they are going to sell in the market.
It is also useful to understand the partnerships necessary to achieve the objective.
The aim of this VTS is not to find the ultimate solution but to scout the right competences inside companies.
The activity of testing demonstrates that Translucent innovation can be tested inside all types of companies, small medium or large, with different dimension and work in different sectors. However, SMEs found this VTS particularly complex and often they are not ready to adopt it in their intrapreneurship discovery process.

## 3.3 What we have learned: pioneers VTS's

From the testing activity of pioneer VTS's, it came out that both can be used inside all types of companies, with different dimensions and different backgrounds. Nevertheless, companies prefer BMC because is easier to use rather than Translucent Innovation. Translucent is a complex VTS, it takes time to be discuss and often companies find the model to difficult, especially SMEs.
If BMC can be used in three, max. four hours, on the other hand Translucent takes at least a couple of days. Firms need a specific explanation of the tool and sometimes they don't have the right answer for each box. For this reason, this VTS is particularly appreciated by large companies that are more structured and can identified the problem well.
Both VTS's let companies identify key partners; Translucent Innovation also figured out all risks and possible limits that will influence the solution. In BMC this aspect is not remarkable. Both VTS's are composed of several components, but they put the customer at the centre of the solution proposed. They feel the gap between the need to innovate and the knowledge for how to do it.
In table 3.4 there is a comparison between these two VTS's.

*Table 3.4 Comparison between Pioneers VTS's*

✖ | insufficient/unprofitable ◆ | sufficient ✔ | excellent

| Pioneers VTS's | Clear Definition of Solution | Definition of technological needs | Risk analysis | Easy to use | Applicable to all type of companies | Customer focused |
|---|---|---|---|---|---|---|
| **Business Model Canvas** | ✔ | ◆ | ✖ | ✔ | ✔ | ✔ |
| **Translucent Innovation** | ✔ | ✔ | ◆ | ✖ | ✔ | ✔ |

## 3.4 Extension of VTS's

In this section we analysed and tested the VTS's derived from Business Model Canvas and Translucent Innovation.

### 3.4.1 Lean Canvas

Lean Canvas (LC) is a 1-page business plan created by Ash Maurya (5) that allows the user to analyse the idea into its key assumption. Basically, it is very helpful to define the strategy of a lean start up.

The LC is accessible to anyone inside the company, because good ideas can come from anywhere. In comparison to BMC, priority is given to the problem that customers have to face and what the possible solutions are.

As the BMC it is composed by 9 blocks, as the following:

1. Customer Segments: Who is the customer? Here it is important to make a strict distinction between customers and users; once the customer is identified, the tool goes more in detail to find early adopters?
2. Problem: What are the top 3 problems you are addressing? How will your early adopters solve this problem?
3. Unique Value Proposition: how will you get customer attention? it's the match between problem and solution; it's the benefit that derives from both;
4. Solution: How will you deliver the value?
5. Revenue Streams: how will you price your offer?
6. Channels: How will you build a path to customers? How will you reach the customer?

7. Cost Structure: what are your costs?
8. Key Metrics: how will you measure success?
9. Unfair Advantage: how will you defend against competitors?

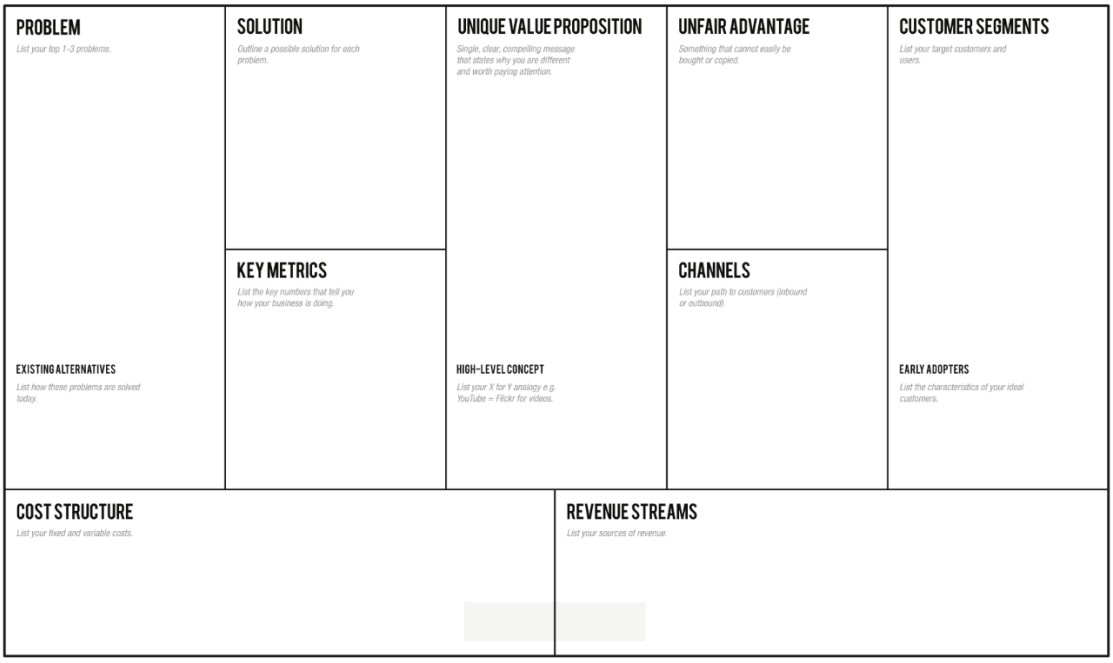



*Fig. 3.7 Lean Canvas*

Because it was space constrained, Ash Maurya added more elements [68]:

- Problem: a problem box was included because several businesses do fail to apply a lot of effort, financial resources and time to build the wrong product. It is therefore vital to understand the problem first.
- Solution: once a problem has been recognized the next thing is to find an amicable solution to it. As such, a solution box with the Minimum Viable Product "MVP" concept was included.
- Key Metrics: a start-up business can better focus on one metric and build on it. The metrics include the range of products or services you want to provide. It is therefore crucial that the right metric is identified because the wrong one could be catastrophic to the start-up.
- Unfair Advantage: this is basically the competitive advantage. A start-up should recognize whether or not it has an unfair advantage over others.

Company F is an innovative start-up, located in Lecce, operating in the construction field, with particular reference to construction elements, components and innovative materials. The society was born with the objective to transfer to the market all the innovation developed by the members of company F in a lot of years of research.

The innovative start-up works in the building sector and it was set up by five partners, most of whom are engineers. Company F specialises in the development of new building components and materials including structural glues, pultruded materials, nano-materials, structural glass, ceramics and tensegrity structures. They pay particular attention to energy efficiency and the elegance of forms.

Its business model is based on transferring to industrial application the results of the scientific research carried out by the members themselves. All components produced by Company F, for new or refurbished buildings, can be made with the machinery used in existing manufacturing companies. And the reduced number of their elements contributes to the technological simplification that underlies eco-sustainability and motivates the choices of Company F.

As a research and development company whose personnel have affiliations to universities or research centers they make use of their facilities to conduct laboratory tests. These include the Department of Engineering at the Polytechnic University of Marche, the Department of Innovation Engineering at the University of Salento, and the Department of Engineering at the University of Messina.

The LC allows the start up to easily identify the problem and the main advantages of the solution to overcome the problem. Thanks to this tool, Company F can prepare a pitch to present to business angels or investors to finance the project.

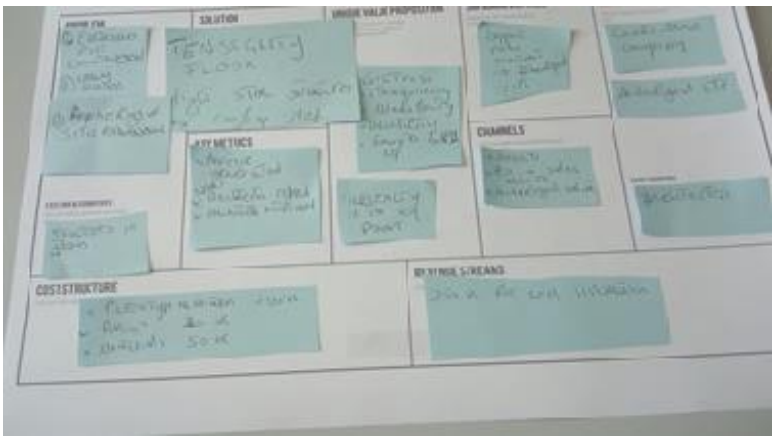



*Fig. 3.8 Lean Canvas Company F*

LC underlined that one of the main problems for start-up is the time. Time is the scarcest aspect of the start-up. LC should overcome this problem through a faster approach; according with literature [69] LC should support companies in the definition of problems in a couple of hours. From our research and from our testing activities we figure out that this easy and fast approach is possible only if a company does not have a real problem. In this case it's possible to define the most important aspects of the solution and in the meantime to change the thoughts several times before finding the perfect plan.

It is concise because it forces the entrepreneur to focus on the essence of the product; it is portable because a single page of business model is easier to share with possible investors; it is effective because you can get strictly to the point. The aim of LC is to find business angels that will invest in the business idea.

Whereas the BMC tries to provide for a complete model of a businesses, which can be used for testing and search in lean start-ups, the LC seems more focussed on being a one-page summary for start-ups with "simple" business models (since it excludes some aspects included in BMC).

In this use case, company is a "phase 0" that means the start-up identified a problem that need to be solved through a sustainable and economic solution.

Through the LC, the company should figure out the key milestones of the idea:

- The main problem is the rebuilding of churches or buildings after the earthquake;
- The solution is the tensegrity floor, a new kind of slab completely done in glass with particular characteristics. It is versatile, easy to build and covers big structures;
- The unique value proposition is the transparency and that it can support a heavy load; with electronic deformation control, it can also be connected to the network and become a screen.
- The customer segment is constructors' companies and early adopters are architects.

The solution can be applied at the Roman archaeological site in Castelleone di Suasa and at the medieval castle of Arquata del Tronto damaged by the recent seismic events.

LC determined the strategy for Company F in order to reach the market in a quick period, avoiding the waste of limited resources.

### 3.4.2 Melt Frame Canvas

Miikka Leinonen is a Finnish visual strategist and the author of the innovative tool Melt Frame Canvas (MFC) (6). It is a new business model for strategy creators and visual

communicators interested in exploring and managing creative, new ideas and paths to innovation.

Melt Frame is a dynamic map, where new dependencies become visible.

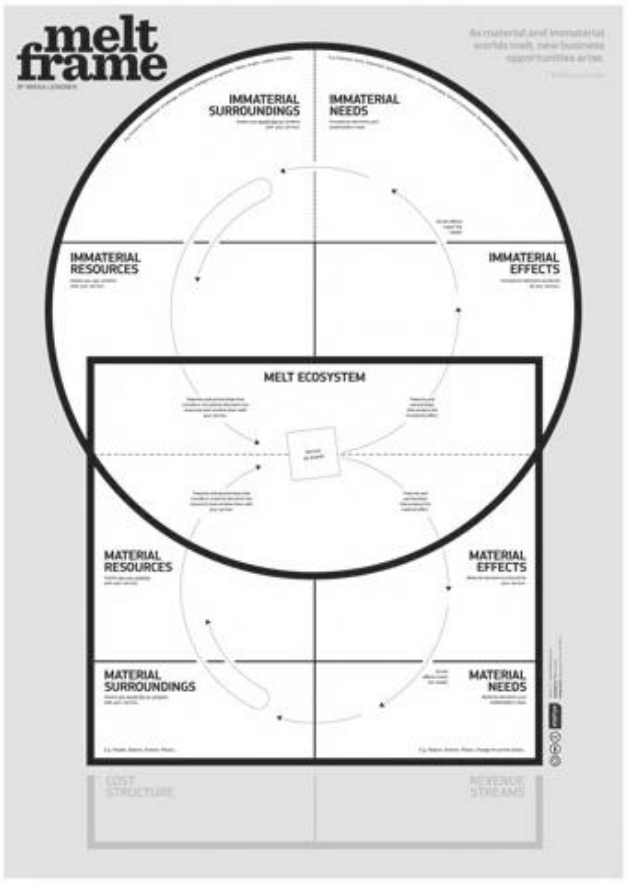



*Fig. 3.9 Melt Frame Canvas*

The basic idea of MELT is that there is a material world, the square at the bottom and the immaterial world, the circle at the top of the VTS. MELT is a box that can be divided in 2 parts. The bottom part is the material world, the tangible world, which can be divided into objects and actions; the top part is the immaterial, the intangible world related to emotions, competences and knowledge.

The bottom part, the material world is reduced by scarcity. In this area, people can control, repeat and measure things in a very precise way. Then there is the immaterial part; it cannot be owned, it cannot be protectived or boxed, that's something ruled by abundance. This world offers unforeseen opportunities connected to desires, competences, luck and beliefs that are difficult to possess, but that truly influences companies' strategies.

According with MELT strategies are moving from the material world to the immaterial one. A focus on the immaterial world is necessary, but that should not mean abandoning the material world. Product and service continue to be strongly attached to the material world but this should be combined with the immaterial; a mix of strategies will boost company's economy and create more value.

Why this change? There are several drivers that cause this transfer.

First, needs are becoming more immaterial, linked to the meaning of life and to emotions.

Second, companies drive the market. They fierce global completion in the material world. They are struggling to find new competitive ages there. They are reaching the immaterial one with brands and with creating emotional bonds with people. The third driver is technology.

Technology is merging the two worlds together. The material world is pushing itself up into the immaterial one and vice-versa.

Immaterial elements are becoming more tangible: emotions and thinking are more and more visible and concrete through the introduction of new forms of communication, for example social media.

An example can be the smart living environment such as smart buildings where lights or heating are regulated according to user's behaviour.

Material elements are flattering to the immaterial world: news, information and entertainment start to lose their one-sided material form; it's very difficult to catalogue them in a specific area.

Through technology, some material elements have lost their physical forms and became more invisible. Let's think about social meetings. The number of social relationships is constantly increasing; social network such as Facebook or Badoo favour this new kind of relationship.

Companies don't know what it's going to happen with new technologies, for example 3D printing. These things are more immaterial than we use to have. At the same time, the immaterial world is coming down, is becoming more tangible, more material. For example, we are sharing more information, knowledge and emotion than ever before, through social media.

As a company's service become more immaterial, immaterial elements such as preferences or taste become an inseparable part of the service [70].

This overlapping between material and immaterial world is called MELT.

Once the world is defined, the tool separated the needs and effects on the right side, from resources and needs on the left side. The model first identified the needs on the right side. Here is what the service does for customers. On the left side the companies have to transform surroundings in resources.
This model called by Miikka MELT, can be called internet, sharing economy, social media, digitalisation, artificial intelligence, IoT, home automation, data networks etc but in any case, it represents the evolution of a world that is more and more complex and that has to be supported by a strategy. MELT has a huge impact on every business. Companies that build their growth only in the material world are destined to collapse.

Company G is an organization who produces machinery for mattresses; it uses the Melt Frame Canvas to come up with a product for the sensory technology for mattresses that offer a service as well.

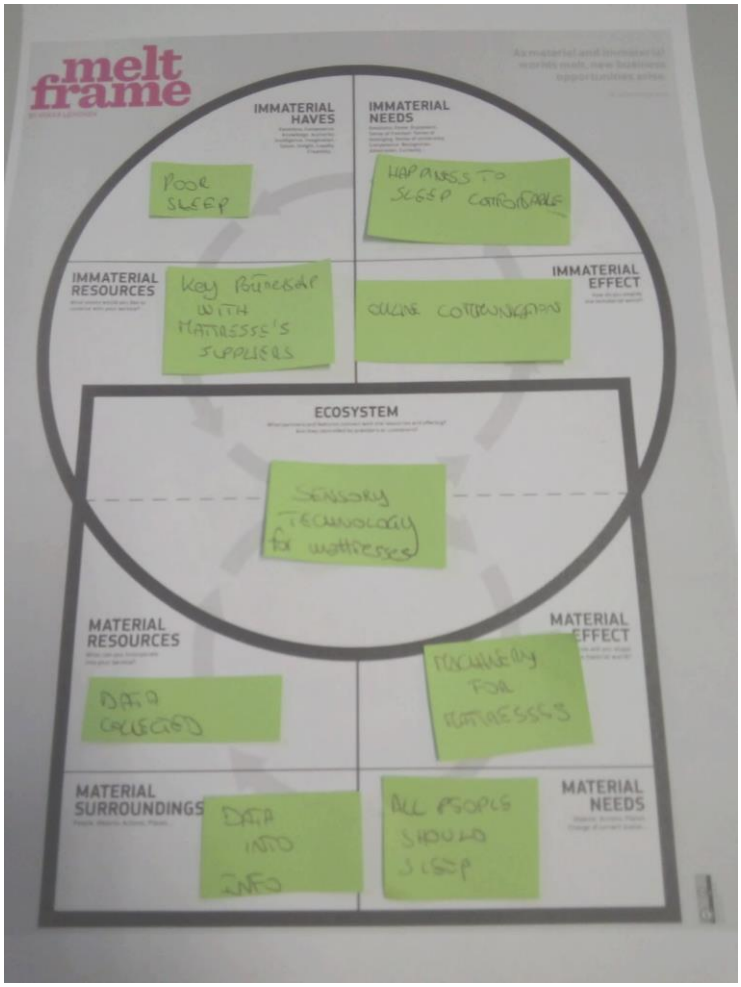



*Fig. 3.10 Melt Frame Canvas Company G*

According with MELT strategy, first the company has to add the service in the middle of MFC, in the ecosystem box. In the case of Company G the solution is proposed, the sensory technology.

It is a mattress with sensors that would showcase "intelligent" features that will read the signals of the body through pressure sensors positioned around the mattress. As a user, these sensors will be imperceptible. The data collected by the sensors, such as areas where there is more force, areas of more weight, etc., will be relayed to a computer which will generate recommendations for a truly customized mattress. From this point, a made-to-order mattress can be produced to optimally satisfy the clientele.

Once the ecosystem is clear, the tool underlined the material effect, the tangible stuff that the company offers to customers. In this section we put the machinery for mattresses and the need addressed is that all people should sleep.

The feature is that Company G put sensors on mattresses to collect data and offer solutions more in line with customer needs.

On the other hand, the immaterial part is the need to guarantee high quality sleeping, offering comfort to people; the effect is to generate trust in machinery produced by Company G, it is also to guarantee a high quality product. In the effect we highlighted feeling of people.

The right part of MFC is useful for companies to analyse their strategies with customers. Companies can make a list of customer's needs, material and immaterial, understanding their offer to meet peoples' needs.

This is the value proposition of the company, what the company produces for customers.

Once this is complete, it is possible to move to the left side. First, we have to consider the material that surrounds the company and how to use it, becoming a resource. Here we can consider all data that can be collected from the sensor and how to transform it in useful information. For example, to improve the logistical system of the company or to define the commercialisation strategy.

Then we move on the top, the immaterial world, which means customer emotions, knowledge and talent. In our case study it is represented by people who are experiencing poor sleep, they are unsatisfied with their current mattress or people who follow healthy lifestyle activities.

Company G could transform these surroundings into immaterial resources through the establishment of a key partnership with mattresses' suppliers. The idea is to establish a

durable relationship with key partners i.e. IKEA, a world-wide furnishing company with operations in 42 countries.
Another immaterial surrounding can be happiness to sleep on a comfortable mattress; this aspect should become a resource, through the partnership with online communication that generates positive feedback.
After the application of this VTS, Company G found out the added value of its solution as well as how to reach the customers according to their needs. In this way the company can successfully focus their investment on commercialisation and internationalisation strategy, trying to enter in a new market.

### 3.4.3 Value proposition canvas

The Value Proposition Canvas (VPC) is a tool which can help ensure that a product or service is positioned around what the customer values and needs [71].
The Value Proposition Canvas was initially developed by Dr Alexander Osterwalder [72] as a framework to ensure that there is a fit between the product and market.
It is a detailed look at the relationship between two parts of the Osterwalder's broader Business Model Canvas which includes customer segments and value propositions.
The aim of the VPC is to match the needs and the jobs to be done for the customer segment and the value proposition of the companies, to adapt the product to the market or to fit the solution with the problem.
At the centre of the Business Model Canvas is the Value Proposition, which represents the value offered to customers and explains how the company is creating value for its customers and can be seen in Fig. 3.11.

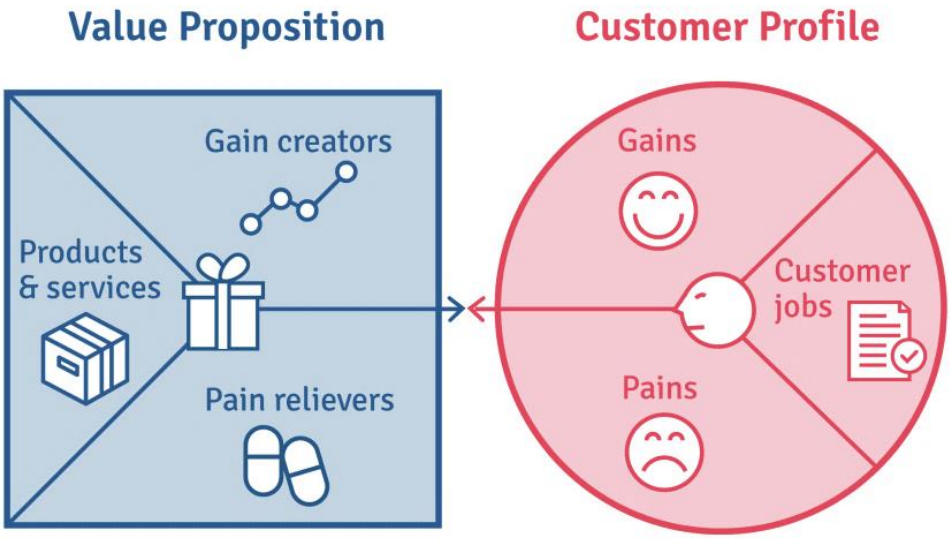



*Fig. 3.11 Value Proposition Canvas*

VPC helps the company design products and services that their customers want [73].

It describes the two sides of the PVC: on the right side one can see the *customer profile* where it should clarify the customer understanding, and on the left side one can see the *value proposition* where how the company creates value for customers should be mapped. The model points out the *"pains"* the users straggle with and the *"gains"* which they strive for, held against the "*pain relievers*" and "*gain creators*" the organisation offers [74].

As already underlined, the VPC is structured in two main blocks: the left one focused on the value proposition and the right one, focused on the customer, that is the starting point. There are many customers, from the production manager to the final user, who is the most important one. So, it shall be figured out by the customer segment, the customer profile on the right block.

The *Customer Jobs* functional type represents such factors that fulfil the essence and specific purpose of the workers. Customer jobs are divided up by Osterwalder in terms of social, emotional, functional and basic types of factors.

Functional factors are connected to a specific task or a specific problem; basic factors are related to fulfilling basic human needs such as eating, drinking, sleeping, etc; social factors are those that are created through communication with others or are connected to other people; emotional factors are related to feelings and to one's inner perspective. Once the customer is defined, gains and pains should be figured out.

*Gains* can also be divided in the same way as customer jobs. Functional factors represent functional utility in terms of time for example, or money, or effort. Social ones are related to benefits that can be replicated by other people as well.

Emotional factors include good design, better quality of life. Basic factors are cost reduction, fewer investments.

*Customer gains* are the benefits, the lists of desires, expectations and requirements a person would like to achieve once they get a job.

*Customer pains* on the contrary represent the list of points that influence the work, such as risks, obstacles, difficulties to work on a team or to reach the workplace, so all the negative experiences a person faces in getting the job done.

Once you narrow the profile of the customer, you have to sketch out the value proposition of your product or service. First you have to identify the list of products or services that can be matched with customer jobs already identified. They can be tangible (manufactured goods), intangible (copyrights, licenses), digital or virtual (online recommendations).

Once the product has been figured out, it has to be underlined as *pain relievers*, to show how you intend to reduce or eliminate the list of pains identified in the right section, such as negative emotions, undesired costs and situation, risks.

The final box is about *gain creators*, so how do you intend to create outcomes and benefits for the customer, to satisfy his or her expectations and desires.

Company H is an independent research and technology organisation (RTO) with the aim to reduce the gap between academia and industry, through the use of open innovation networks and practices [75].

It offers a wide range of services to its associate members, such as technological solutions, manufacturing support services, training, support to companies, apprenticeships and so on.

In this case study, we used the VPC, that is a plug in of the Business Model Canvas to understand if the solution proposed by Company H, named SelSul, is suitable for its customers. SelSul is a decision support system for maintenance and repair activities based on Bayesian model. Thanks to the use of the VPC, it was possible to define the best customer segment to test the technology, considering all positive and negative aspects that will affect the customer segment using this technology.

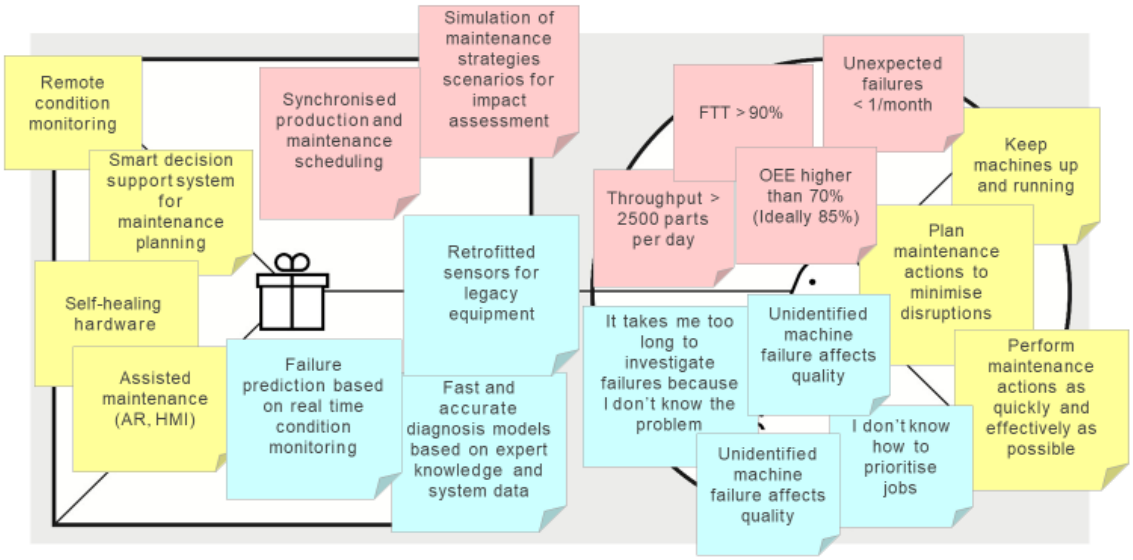



*Fig. 3.12 Value Proposition Canvas Company H*

Thanks to the VPC Company H define:

- the main **customer segment***:* automotive sector or white good industries with a very complex environment;
- the **value proposition:** the adaptability and the flexibility of the system.

In connection to the creation of the VPC in Fig. 3.12 we have identified that customer jobs belong to functional types rather than to social or emotional; workers find difficulties in planning maintenance actions to minimize disruption and in keeping machines working.
The main gains are connected to the functional types as well and pains are related to the difficulties in the identification of failures.
According to the example, the VPC is useful to define the customer segments, who they are and what they are looking for.
VPC helps Company H to communicate the quality of the solution proposed, especially by emphasizing its flexibility, adaptability and capacity to work in complex environments.
The use case also allows to demonstrate that VTS can be deployed not in only in companies but also in research centres.

## 3.4.4 Value Discipline Tool

The Value Discipline Tool (VDM) is a model created by Treacy Wieserman [76] that helps organisations understand what they want their customers to value them for.

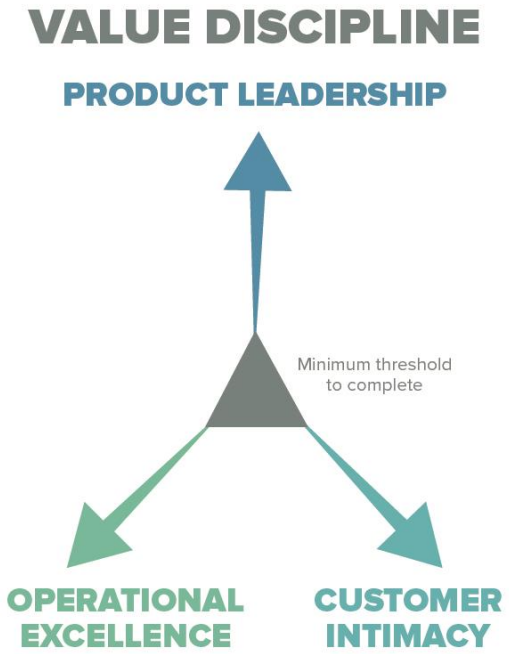



*Fig. 3.13 Value Discipline Tool*

This tool helps organization to understand what companies really require. It is a triangle with 3 different points:

- Product leadership;
- Customer intimacy;
- Operational excellence.

The model states that in order to be competitive, an organisation must be competent in all three disciplines, but to be a market leader, an organisation must excel in just one discipline. Treacy-Wiersema further proposes that an organisation cannot excel in all three disciplines because the basic organisational culture, structures, people, facilities, processes and business models that lead to excellence in any one discipline are incompatible with achieving excellence in others. For example, Operationally Excellent organisations tend to have a limited range of products / configurations as this is cheaper to build and deliver than a vast range of products and configurations which is typical of a Customer Intimate organisation.

The methodology not only assesses the value-discipline of the organisation, but it also assesses the vision, goals, objectives, strategies and business processes for which value-discipline they are most aligned with. This assessment is then used to evaluate the

alignment between the organisation's perceived or desired value-discipline and their operational value-discipline.

In details, the three main categories of the model:

- *Product leadership* indicates products that are the best in the market, with the highest value for customers. The principles are the innovation of the company, how innovative the company is; the capacity to contain and manage risks; the recognition of the success of the company; the capacity to educate and lead in the market in the use of the new products or services promoted.
- *Customer intimacy* indicates how close the company is to the client. It shows the relationship with the customer. If companies know customers well enough, if they really understand their needs, they are able to create an innovative product, with new value for all stakeholders. The principle here is a full range of services available to serve the customers on demand and a corporate philosophy and resulting business practices that encourage deep customer insight and breakthrough thinking about how to improve the customer's situation or business.
- *Operational excellence* underlines the quality of the production. It is important to produce in a cost-effective way, in a sustainable way. The principle that influences operational excellence is the efficient management of people, so the training of employees is the most efficient one at a lowest cost; the management of efficient transaction such as the maximisation of all parts of the transaction, including the supply chains; dedication to measurement systems that ensure good quality and cost control, with measurement targeted at finding ways to reduce costs; management of customer expectations so the offer of a variety of products and services that match the expectations of customers. The dimension to take in consideration here are the organisational performance, the quality and the costs.

Company I is set up in the Marche Region and performs design, manufacturing and maintenance of molds as well as the molding of metal components for the automotive appliance sectors. The continuous interaction between R&D, Molds Department, Molding and Quality Department guarantees the customers innovative and winning solutions. The research and development office deals with the design of the molds and the industrialization of products that will then be realized in their production lines. The long experience in this sector allows the company to excel in the design f complex transfer and stepper molds. They collaborate with their customers already in the study phase of the product to optimize

the geometry of the element and the consumption of material. They are able to simulate all the molding phases through the use of virtual prototyping techniques and then make changes to the element to avoid breakage or cracks during production. They ensure end-to-end control of the production process, from the simulation of the forming process, to the design, passing through the construction of the equipment up to production. Their mold production department follows all the phases of the details processing and deals with the assembly and adjustment of the molds.

Starting from molding with manual, progressive and transfer technology up to assembly lines, welding robot stations and immersion washing systems. By investing in cutting-edge technology, modern organization in quality, environmental and safety issues, today they work with large multinational customers in their reference markets. The attention to their stakeholders, combined with the expertise resulting from decades of experience and internationalization, allow us to be leaders in our industry.

The company is a medium company, with 150 employees and income of 22M in 2018.

On the contrary of other VTS, value discipline tool does not allow for the validation of a new idea, but it supports companies in underlining their position in the markets, highlighting the weaknesses in the commercial strategy. The tool is particularly useful when companies have a lack of sale, or a stagnant economy.

The VTS is particularly useful for structured companies who have to change their business models.

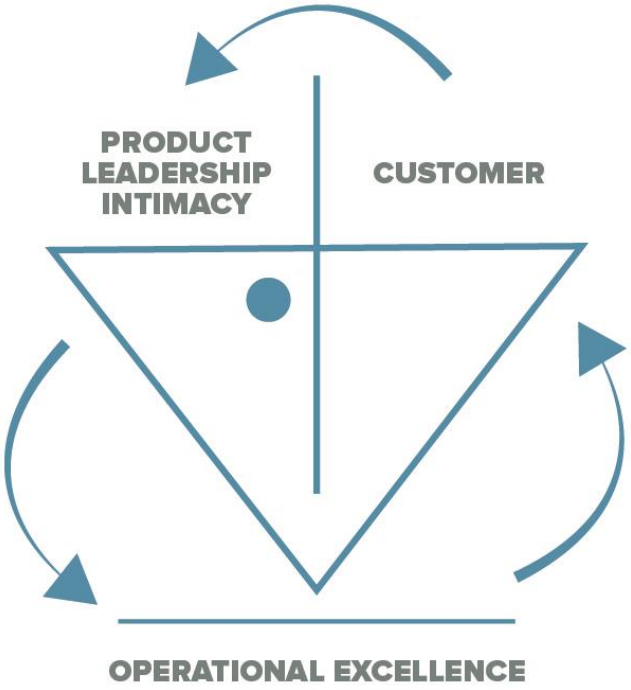



*Fig. 3.14 Value Discipline Tool Company I*

Company I applied the value discipline model to define the strategic focus of the company and to understand the position in the market according to customer needs and product leadership.

As demonstrated by VDT, Company I is focused on the product, but less on cost leadership. An organization that focuses on cost leadership will always aim to provide its customers with high quality products or services at competitive prices with ease of purchase. The organization focuses internally on the streamlining of processes. Making as few errors as possible, minimizing superfluous service, standardizing and increasing (economies of scale) are part of this procedure.

According with the results of the map, Company I has a strong product leadership and a strong position in the market. The need of the company is to be more oriented towards the customer, because at the moment there is a strong commitment to the production but not with the customer. In the next period the strategy of the company will be to orient the production to the customer, identifying their specific needs and paying attention to them.

### 3.4.5 Double Diamond Design Process

Double Diamond is the name of the design process model developed by the British Design Council in 2005 (7).

It is structured in four distinct phases – Discover, Define, Develop and Deliver – and help the company design the process [77].

According to Double Diamond, the process of ideation can be divided in two main features: "divergent thinking" and "convergent thinking". The first one is related to idea' creation, the second one to narrow down the best one and validate it two times, for problems and solutions proposed.

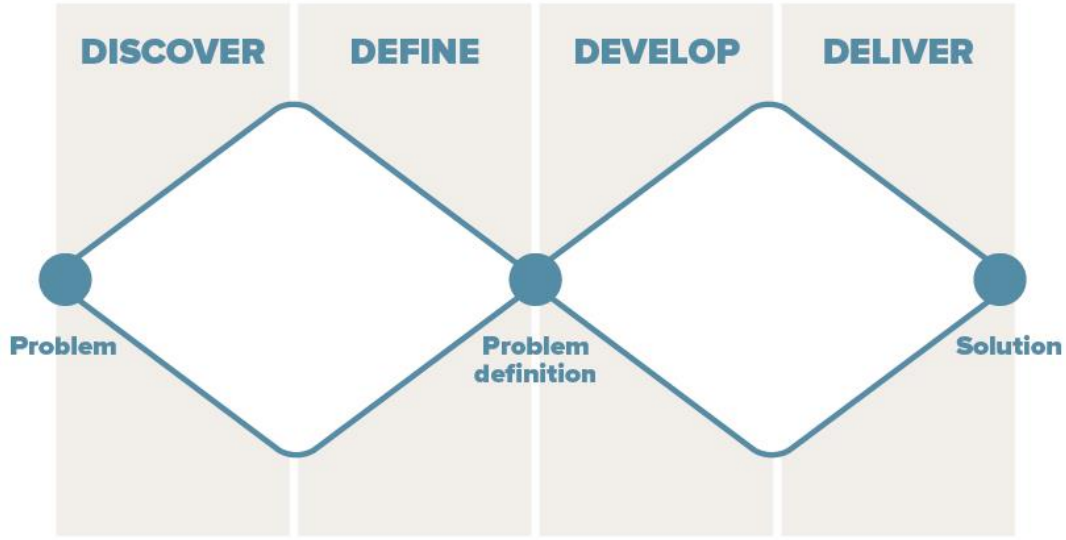



*Fig. 3.15 Double Diamond Design Process*

The double diamond is structured in 4 phases:

- **Discover** | This first quarter represents the start of the project. Designers try to look at the world in a fresh way, notice new things and gather insights. Here it's should analyse possible variables that affect the problem and all the possible solution. Usually companies start laying down their problem, presenting possible hypothesis and defining ways to overcome the problems. It is a good exercise to help employees in creative problem solving, identifying customers' needs and translate these needs in possible solutions.
- **Define** | The second quarter represents the definition stage, in which designers try to make sense of all the possibilities identified in the Discover phase. Which

matters most? Which should we act on first? What is feasible? The goal here is to develop a clear creative brief that frames the fundamental design challenge. In this phase companies filter all the information got from phase 1 and elaborate them, reducing resource waste, seeing hidden opportunities and setting a list of priorities that have to be considered. This phase end with the approbation or the rejection of the solution; this is a make or break moment, when top management decided if go through with the project and gives it the budget and the resources needed for it to carry on.

- **Develop** | The third quarter marks a period of development where solutions or concepts are created, prototyped, tested and iterated. This process of trial and error helps designers to improve and refine their ideas. Different departments of the company cooperate together to reach the goal, that is the prototype.
- **Delivery** | The final quarter of the double diamond model is the delivery stage, where the resulting project (a product, service or environment, for example) is finalised, produced and launched. The company has finalised the product and it is ready to reach the market. In this phase company also measure the satisfaction of the customers, in order to quantify the value of the brand.

We adopted Double Diamond in Company L, a multidisciplinary group of professionals (product designers, engineers, architects, graphics, and user experience (UX) designers) that work passionately, with commitment and seriousness.
Company L works to transform innovative ideas, with the help of cutting edge and state of the art technology, into product design.
With the help of its solutions, companies can reduce their costs and optimize profits by utilizing Company L valued added services. Company L works in the Italian medical equipment market; in the last years this market was dominated by US manufacturers either wholly owned subsidiaries or through direct import from other plants.
The idea of Company L consists in the development of a wereable device to monitor vital parameters of a person. Through Double Diamond it was possible to define the product: a wereable device, easy to use and with a wireless technology, to be sold to start up business, preferably in the earlier stages of operations. This VTS enables Company L to understand the problem and the opportunity of the medical markets in Italy, visualising the area of intervention and the main aspects of the solution.

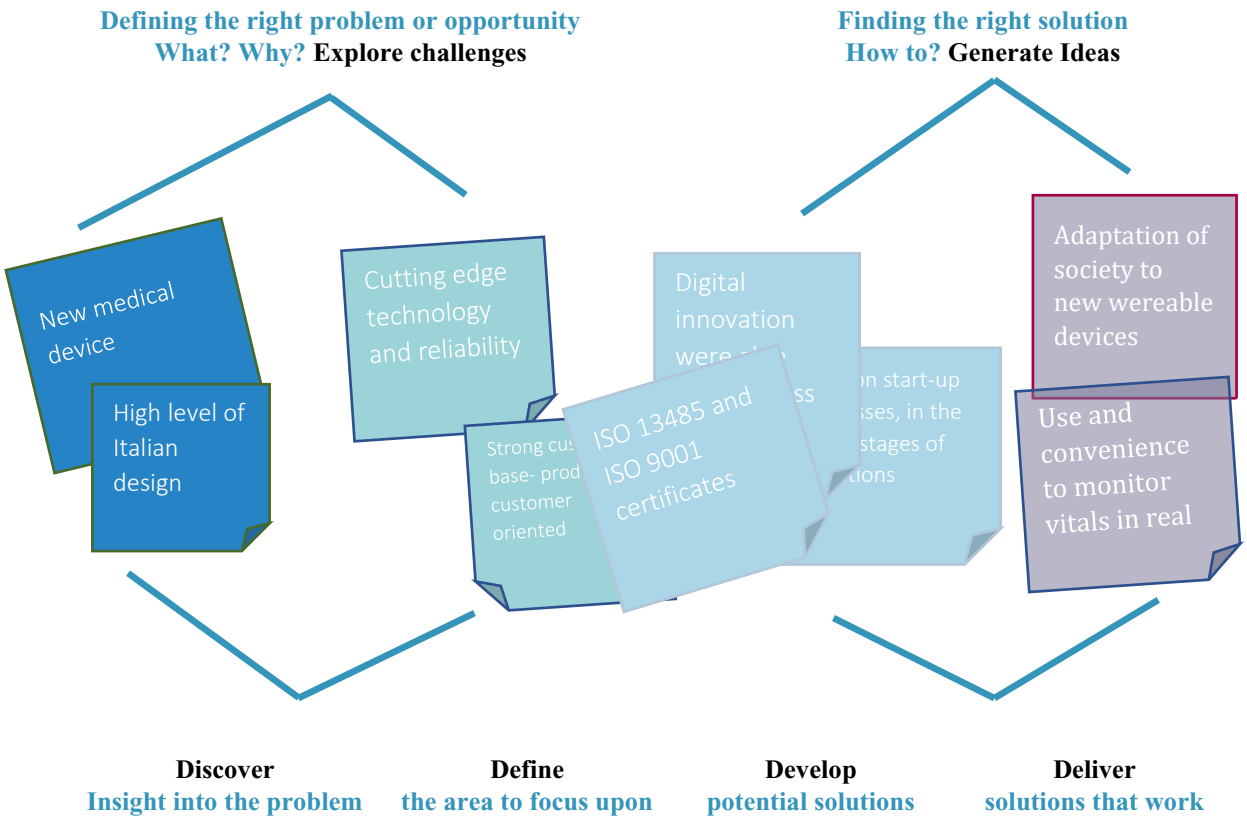



*Fig. 3.16 Double Diamond Design Process Company L*

This VTS can be used at the end of the ideation process; as said before during the process several ideas can be created before refining and narrowing down to the best one.
In order to discover which ideas are best, the creative process is iterative. This means that ideas are developed, tested and refined a number of times, with weak ideas dropped in the process. This cycle is an essential part of good design.

### 3.4.6 Venture Design Process

The Venture Design Process is a tool created by Alex Cowan, an entrepreneur that currently works to support companies in their innovation processes (8) and available in fig. 3.17.

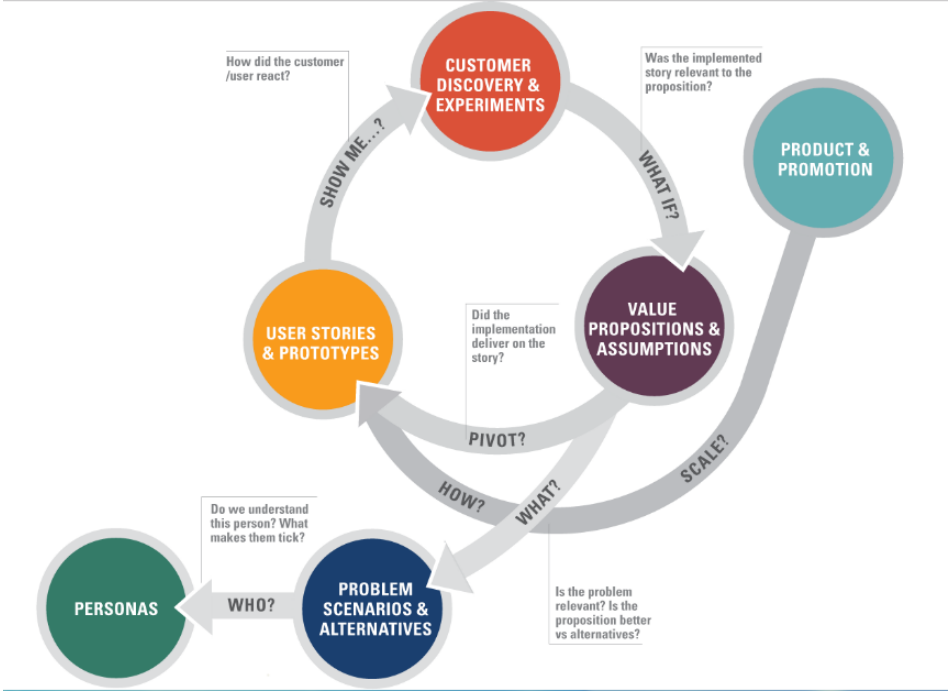



*Fig. 3.17 Venture Design Process Company M*

It is composed of 6 different blocks:

- Personas; it's the customer or user a company wants to reach. Here the type of customer should be understood, why they are willing to pay for your product or service;
- Problem scenarios and alternatives; internal or external aspects that will affect the product. They should be tasks, desires or habits that will influence the characteristics of the product and company has to be prepared to find alternatives or solutions;
- Value propositions, assumptions and experiments; identify key assumptions and providing them as quickly and efficient as possible;
- Customer discovery & experiments: tasks materials to help company to define the main concept of the idea proposed;
- User stories and prototypes; story board to describe the idea ad to find investors for the realisation of the prototype;
- Product and Promotion; resources company has to find for the implementation of the final product.

Company M is an innovative start up that works for the development of a new solution for wave energy exploitation based on a converter profile able to reach unparalleled performance in terms of energy conversion, reliability and low CAPEX / OPEX.

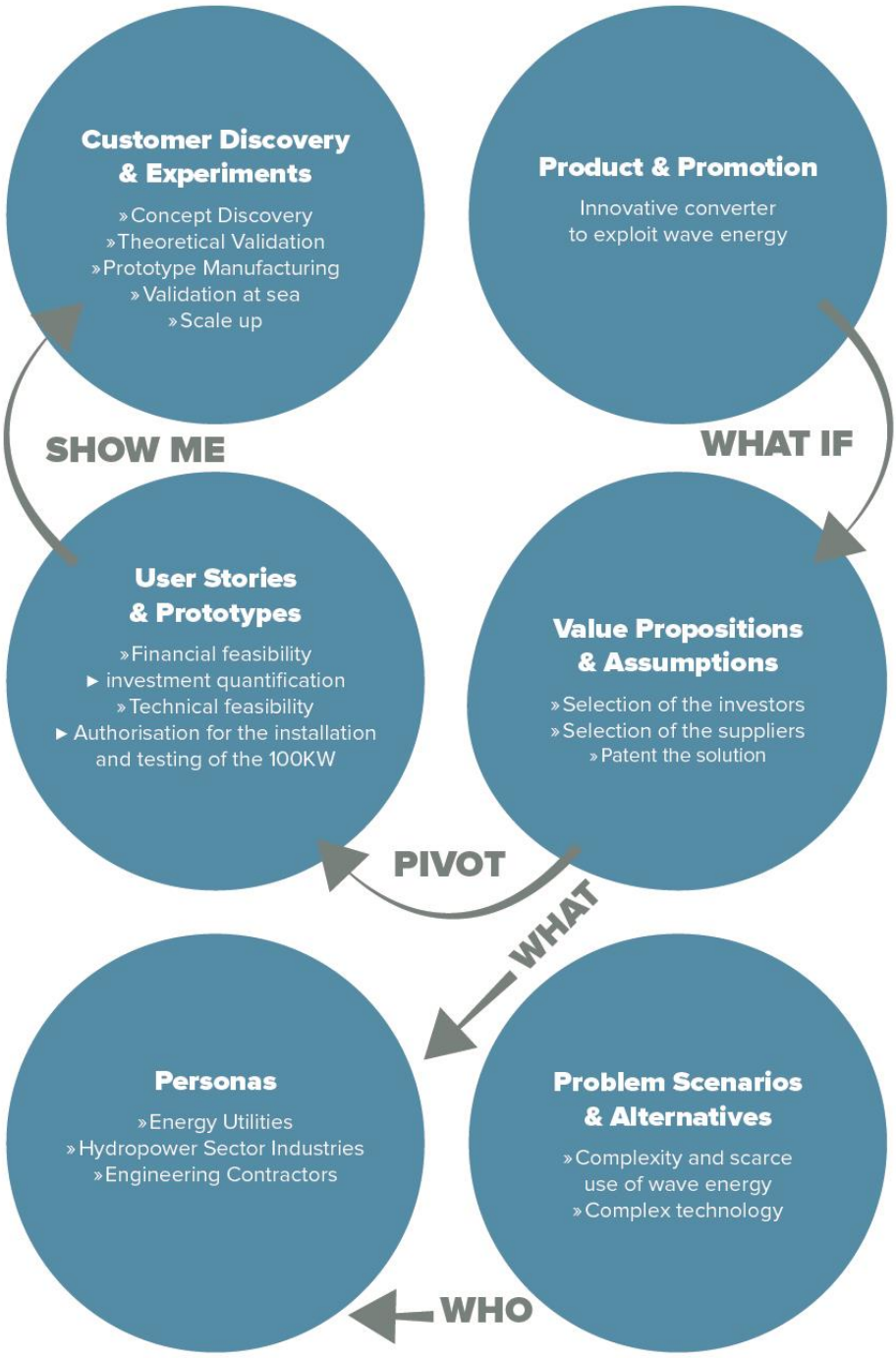



*Fig. 3.18 Venture Design Process Company M*

Through Venture Design Process Company M could identify the **value proposition** of the solution: simple and effective profile strongly reduces the production / installation costs and allows for a high conversion efficiency also with small and irregular waves, increasing the production and the application potentialities.

VDP helped also Company M in the identification of **key partners, or personas** useful for managing the project: energy utilities, hydropower sector industries and engineering contractors.

The VDP highlighted the main problems Company M could face, such as:

- The complexity of the technology;
- The complexity and scarce use of wave energy.

VDP supported Company M to organise a pitch in order to present its solution to investors.

## 3.4.7 Business Modelling Tool

This tool was created by Vittorino Filippas, professor at University of Trento and business developer [78], to boost innovation. The main idea is to produce something new, innovative for a specific market, having clear in mind who the customer is and what their unspoken needs are.

The model has a circular structure and six different ingredients compose the business idea.

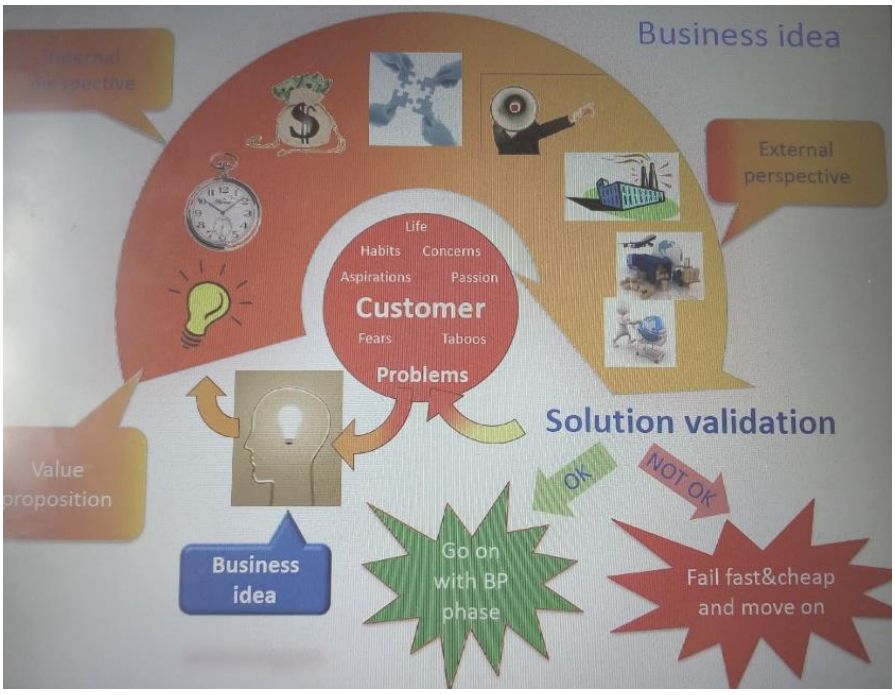



*Fig. 3.19 Business Modelling Tool*

At the centre there is the customer with a problem that should be solved.
First, **the product** and its added value, the market and trends that influence the market. Second **competitors**, the time they need to develop a similar solution. Third **cash flow**; what are the main costs the company has to face and how. Fourth **competences needed**: what are the main skills of the team, what are the potential partners and what should they do. Then the **communication channels** and the **non-commercial marketing**; company has to be visible in the market and its product or brand should be able to clearly communicate.
Last **channels, distribution** and all the actors involved in the **supply chains**. Here the company has the opportunity to identify a "killing issue", all the aspects that constitute a risk and that can negatively influence the success.

The model was applied to Company N, a medium company located in Jesi.
Company N is a software house leader in the Information Technology field. Founded as the software industry, it develops towards a solution factory, anticipating and applying consistently the paradigms established by the new information economy and digitization.
Company N has a skilled team that develops its owner solutions, such as ERP and Suites Management, Scheduling, Multi Project Management, Document Management sales in national and international countries.
Business Modelling Tool (BMT) was used by Company N to define its **product** and the main features of it: HiPlan, a multi project management (MPM) software.

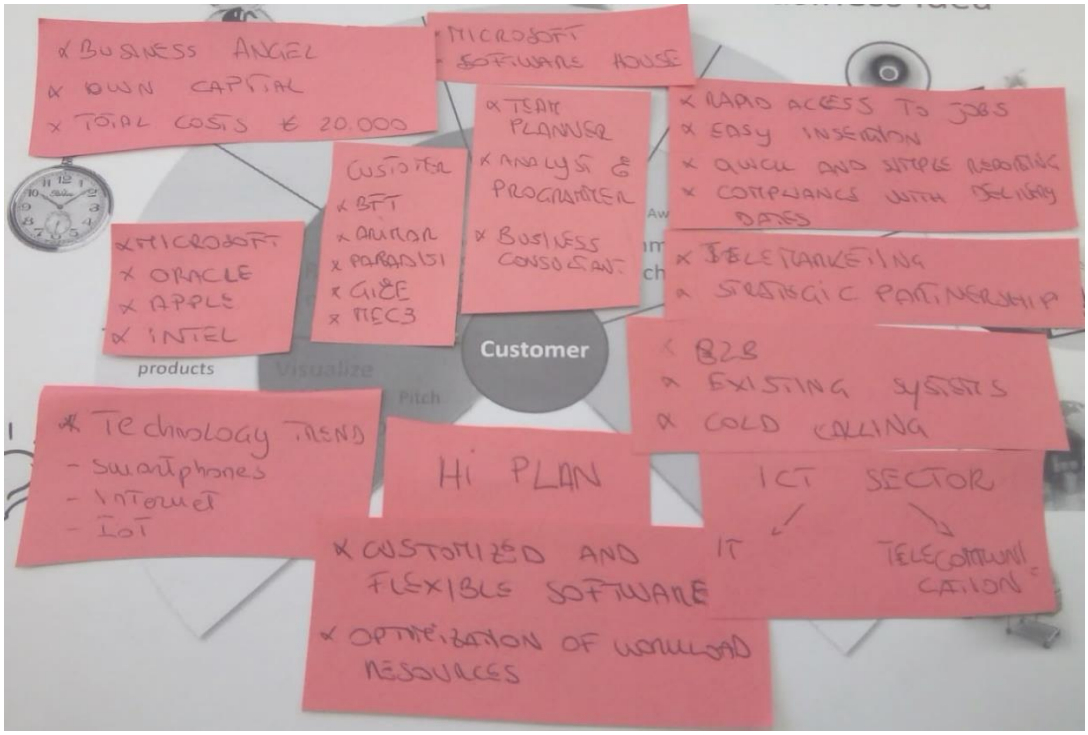



*Fig. 3.20 Business Modelling Tool Company N*

Company N used BMT to define the main characteristic of HiPlan, a software application that allows end-users to sort and file information. Through the BMT, Company N defined the added value of HiPlan: it is an informative system, a multi-project management web-based system. It optimizes planning, prototype, engineering, production, pre-series processes, estimated completion time of project tasks, utilization of resources, and date of delivery.

Through BMT, Company N identified its market as the ICT sector, engaging in the provision of information and technological services of this sector. BMT allowed to Company N to understand the main features of its market: is a well-established one characterized by innovative, dynamic, long-established and well-informed major players such as Microsoft, Oracle, Apple, Intel, and others.

The BMT figured out the characteristics of **competitors**: big players with ab high rate of substitutability of products or services in the sector. According to the use of BMT, the direct competitors of Company N are Microsoft and Oracle Primavera.

Through the BMT, Company N could describe its customers: well informed target that are constantly looking for services/products that can best satisfy their needs and business challenges.

BMT supported Company N to find a way to overcome this problem through a strong customer satisfaction and a quick technology adoption. Adopting new technologies faster than competitors provides firms with a distinct competitive advantage. More advanced technology can not only allow the company to conserve resources and improve efficiencies, but it also allows the company to offer more advanced products to its clients,

Regarding the **cash flow**, BMT underlined that the costs could be covered by business angels, the own capital of the company or other investors. To develop the first prototype the company estimates €20.000 of costs.

As demonstrated by BMT, all **competences needed** are available inside the company; analysts and programmers, business consultants and a team manager that coordinate all the tasks will guarantee higher value to HiPlan product.

Concerning **channel**, the results of BMT suggested to establish or consolidate partnerships. Company N is a Microsoft Certified Partner and collaborates with Microsoft to deliver other solutions to clients. This channel can be exploited to sell HiPlan.

To reach the market and become more visible, the **communication channels** that should be used according to BMT are:

- Direct approach through Telemarketing;
- Direct telephone contacts to potential customers and businesses.

Regarding **distribution,** BMT suggested to Company N to focus on the searching of clients in the mechanical and mechatronics industry, contacting the technical/design department of potential customers. The results of BMT demonstrated that at the earlier stages, Company N can sell the software to clients that already had some other products of its offering, but that represents just 5% of the current customer base for HiPlan. This means that the company has to implement an exhaustive research plan of possible customers to enlarge its sales of the software. Local partnership can be established to reach customers.

## 3.5 What we have learned: extended VTS's

As demonstrated in the previous chapter, all the extended VTS's support companies in the intrapreneurship discovery process, they have differences and similarities and some VTS's are more suitable in some cases than others.

Starting from **Lean Canvas**, the activity demonstrated that this VTS is particularly adapted for start-ups or for projects that are in an early stage of innovation because it is focused on problems and solutions and it's designed to work for a start-up mindset, helping entrepreneurs build their ideas. It also doesn't' need to be particularly detailed but the point is to get to the key things that matter for the company.

It is more actionable and entrepreneur-focused. It deeply focuses on start-up factors such as uncertainty and risk.

When speaking of **Melt Frame Canvas**, it is particularly useful when businesses want to move from products to combine products with services.

MELT describes material element and shapes the material world; at the same time MELT can flow immaterial element to be more tangible and sharable to others.

To be successful in business you have to understand how this MELT works, how these loops interact and how you can create new possibilities using them to shape the material world and amplifying the immaterial one. For this reason, it is not so easy to use. We tested this VTS inside three companies and according to our results we recommend this model to predict, for example, how changes in your ecosystem's role may affect your customer's behaviour or the requirements for your own resources. The model is particularly useful to move from products to services; to visualize the value proposition and new features of the service; to create a community among the service provided and to find the gaps between offer and customer needs.

Another example of VTS is **Value Proposition Canvas**; according to our research this VTS should be used when a company is not completely aware about the value proposition of the solution proposed and, in the meantime, the added value of the solution can change according to customer needs. It has been applied in a company and in a research center and in both cases the results demonstrated that the tool has a strong impact when actors are looking to enter in new markets, but they are not sure about the final customers.

Value Proposition Canvas can be recommended to communicate the quality of the products especially by emphasizing their emotional characteristics and help companies to investigate the most secrete desire and emotions of customers.

Moving to **Value Discipline Tool**, it supports company in the definition of its strategic position in the market. According to the VDT, companies have to work in three different area: product leadership, customer intimacy and operational excellence. In order to be competitive, companies should be prepared in all three categories, but they should be excellent in one to be a market leader.

The research showed this VTS is particularly useful when a company has to differentiate from its competitors, and it doesn't know in which way to orientate its strategy. It should be applied when a company has to define its strategic focus and the direction to be taken to achieve the market.

**Double Diamond Design Process**, on the contrary, is particularly useful when a company does not have a structured idea, but it has different possible solutions to reach the market. This VTS facilitates companies to solve complex problems, because organisations can go back to the beginning at any time of the process. It can be used especially for the launch of new products or services because it's an agile model and companies can easily go back and forth at any point.

Carrying on with **Venture Design Process**, it can be adopted by all types of companies, but it offers better results with start-ups because you can re-start the process in any moment. However, it is more complex than Double Diamond and companies are not comfortable adopting it. It takes long time to finalize and often the results are not satisfying.

At the end **Business Modelling Tool,** it can be used for all types of companies when the customer is clearly defined. We tested the tool in three businesses and we marked that it is particularly functional when the idea is at a mature level and should be compared with other solutions already present in the market.

It should be used when customers' needs are very clear and well defined. It is more oriented on the validation of the idea rather than on the ideation phase. It supports the company to transform the product into a prototype and to define a commercial strategy.

From the comparison of VTS's, we prove that all of them are based on visual thinking and enhance intrapreneurship discovery. In table 3.5 we establish some criteria to compare all extended VTS's.

*Table 3.5 Comparison of extended VTS's*

✖ | insufficient/unprofitable ◆ | sufficient ✔ | excellent

| Extension of VTS's | Clear Definition of Solution | Definition of technological needs | Risk Analysis | Easy to use | Applicable to all type of companies | Customer focused |
|---|---|---|---|---|---|---|
| **Lean Canvas** | ✔ | ◆ | ✖ | ✔ | ◆ | ✔ |
| **Melt Frame Canvas** | ✔ | ✖ | ✖ | ◆ | ✔ | ✔ |
| **Value Proposition Canvas** | ✔ | ◆ | ◆ | ✔ | ✔ | ✔ |
| **Value Discipline Tool** | ◆ | ✖ | ✖ | ✔ | ◆ | ✔ |
| **Double Diamond Design Process** | ◆ | ◆ | ✖ | ✔ | ✔ | ✔ |
| **Venture Design Process** | ◆ | ◆ | ✖ | ◆ | ✔ | ✔ |
| **Business Modelling Tool** | ✔ | ◆ | ✖ | ✔ | ✔ | ✔ |

After this analysis, we think is relevant to have a comparison between Pioneers VTS's and Extended VTS's, in order to guide companies in their intrapreneurship discovery process. In table 3.6 we reported the results achieved.

***Table 3.6 Comparison between Pioneers VTS's and Extended VTS's***

✖ | insufficient/unprofitable ◆ | sufficient ✔ | excellent

| VTS's | Timing/ Easy to use | Cost revenue analysis | Long term strategy | Identification of customer needs | Applicable to all companies | Value proposition |
|---|---|---|---|---|---|---|
| **Pioneers VTS's** | ◆ | ✔ | ✔ | ✔ | ◆ | ✔ |
| **Extended VTS's** | ◆ | ◆ | ◆ | ✔ | ◆ | ✔ |

From the testing we could underline that Pioneers VTS's have the same level of difficulty as extended VTS's, but they offer better results. Both VTS's, pioneers and extended highlighted the importance of the customers and co-crate new values for customers, but moreover pioneers support firms to make better and faster decisions regarding operational efficiency and the use of resources.

They allow companies to have a long term strategy and to consider risks. Extended VTS's require considerably more qualitative analysis and justification. For the intrapreneurship discovery, they don't pay sufficient attention to competitor analysis and they do not take into account price or trends of the markets. That's why during testing activities companies preferred to adopt Pioneers VTS's rather than Extended VTS's.

## 3.6 Conclusion

As defined in the first chapter, VTS's are tools to develop a future strategy and they are not about looking back. They are not an instrument to look to competitors, but on the contrary help a company in the creation of value from which derive revenues. VTS's are about challenging orthodoxies to design original models that meet unsatisfied, new, or hidden customer needs.

To come up with a well-defined strategy, a company should dream up several ideas and then narrow them down to a short list of possible and feasible options.

Assembling the right team is essential in generating effective new business model ideas. Members should be diverse in terms of seniority, age, experience level, business unit represented, customer knowledge, and professional expertise.

VTS's involve different area of the company, such as distribution, production, financial and managerial. For these reasons, inputs and ideas can arrive from multiple areas and assembly of the right group of people is a key point to generate new ideas.

The research demonstrates that it is not only the R&D unit responsible for generating ideas, but a team with different members will work better. Diversity works and it helps to generate, discuss and select inputs and experiences.

From the testing activity we can underline the need of a facilitator who guides the working group. He needs to:

- focalise the problem and work on that; usually the problem is linked to a customer need. The facilitator here avoids that the WG lose the focus and he bring them back to the problem;
- define rules for participants; if anybody talks in the meantime there are no conclusions; on the contrary facilitator encourages wild ideas, remembering that at the beginning there is no right or wrong, but everybody should express his thought;
- animate the conversation: guide the WG during all the process and be sure they are working in the most effective way.

The research demonstrates that all VTS's boost the ideation process, but some VTS's are more oriented to start up, others to companies. Some VTS's support entrepreneurs in the definition of their market position, others are oriented on the product development.
Another issue emerging from the research is the qualitative methodology used by all VTS's. Our research underlined that VTS's represent a core building block for entrepreneurial growth. They become an extremely useful instrument for evaluating ideas, redacting proposals and finding partners or investors. They contain all the information related to the development of the solution and the sustainability of the company itself.
The research of flexible and appropriate VTS's should be an imperative for all companies that want to sell a new product or service or want to solve a problem. Even if VTS's are flexible tools, all of them have a precise structure and they could map all the aspects who may affect the proposed idea.
The company, who has an idea, should validate and evaluate it. VTS's will support companies to creates value for themselves and also to other stakeholders; it's a strategy, a conceptual framework used to plan future activities.
According to literature [79] VTS's help the company to understand what the main potentials and capacities are, and how to convert them into economic value.
The intrapreneurship process is a mechanism for continuous and rapid innovation, particularly required to test the market and validate or reject the business opportunity. In this complexity, VTS's can lead to more aware and informed decisions. As demonstrated by Delmar and Shane [80], at the beginning literature did not find a relationship between the use of VTS and the profitability of the solution. However, in several recent works and in the last years this relationship became more and more significant. The results of our research confirmed that VTS's, used as independent variables, are strictly connected to companies' performance.

As previously underlined, the ideation process is an arduous and complex task, influenced by several variables, internal and external to the company. It is something that goes beyond the motivation of the entrepreneur to create a new product, but it is influenced by all stakeholders of the value chain such as customers, suppliers and partners.

This means that the entrepreneur should work under conditions of extreme uncertainty with a high risk of failure [81]. To avoid this risk, entrepreneurs should find an appropriate reply to environmental changes, providing innovative products; going deep in this direction, Shirky [82] argues that companies have more possibilities to prosper if they follow a flexible business model, that allows the entrepreneurs to introduce change and readjustments. This is the main goal of VTS's: adjust the strategy of companies during their life cycle evolution.

From the use of VTS's in a group of several stakeholders, several lessons and recommendations can be exported:

- Identify carefully the main topic for the working group: it is fundamental to more clearly define a specific topic, in order to engage companies and obtain a strong commitment from them;
- Find a facilitator to consolidate and lead the activity of the working group: without a strong coordination the working group could not have the chance to work properly;
- Try to involve the companies since the beginning of the ideation processes to raise their interest in the topic.

From the testing activity we figured out three elements that are crucial to effectively manage the ideation process: a good idea, a skilled entrepreneurial team guided with a moderator and knowledge and sharing culture. The entrepreneurial process is a mechanism that changes quickly and subordinates to rapid innovation; VTS's so have to easily test the market and validate or reject the business opportunity.

In this sense, VTS's are a tool that facilitate entrepreneurs in their cognitive processes, creating value and defining instruments to deliver this value according to customers' needs. According to this vision, Magretta [83] says that VTS's are "stories that explain how enterprises work".

A graphical tool contributes to raise creativity and innovation; VTS's incorporate the design think methodology that facilitates the discussion and the brainstorming session and boosts creative development starting from a real problem, ie. customers' needs.

Accoding to Chesbourg [84] “innovation has always been viewed as a process that takes place within the boundaries of a company”.

Anyway, in the last years, according to the new concept of open innovation, companies have changed the path: innovation is characterised by a mix of factors, not only internal to the company but also external.

There is a change in the mentality of entrepreneurs; they are looking for a more customer-centred model, that allows them to re-evaluate their value proposition and to gain their customers in the right moment, with a successful product. The entrepreneurs need a flexible business model that enables them to re-shape their strategies according to all the actors that affect the process [85].

For these reasons, VTS’s are a powerful tool for entrepreneurs and they represent a unique opportunity to evaluate firm configuration effects.

The study demonstrates that entrepreneurs should do an exercise of constant reflection, developing their business models in an interactive and visual way where elements are not disaggregated, but are linked each other. Entrepreneurs can divide the idea in several parts, and they can explain to all their partners, but also to their competitors, the different components that affect the idea.

By using this format, VTS’s facilitate communication with the different stakeholders, becoming the starting point of a creative and interactive discussion on new business opportunities.

# CHAPTER 4
# VALUE CHAIN TOOL

In the previous chapter some of the VTS's presented in literature were tested inside companies. From the testing activities it was possible to underline weaknesses of VTS's.
In this chapter some of these limits of the VTS's studied were discussed and an alternative has been proposed, a new and innovative Value Chain Tool used for the redaction and creation of a bankable project. In the chapter similarities with other VTS's and the novelty of the solution proposed has been discussed.

## 4.1 Introduction of Value Chain Tool

Technological advances and circular economy have established new paradigms in companies, transforming the traditional way of work. These changes imply that managers need to select alternative strategic responses to technological and sustainable change, managing how to best deliver this technology to customers [86].
For this aim, a more customer centred model is needed, requiring businesses to constantly re-evaluate their value propositions to ensure the match between demand and offer.
Also, the model should start from the analysis of the technological, environmental or social need to be satisfy by companies.
Entrepreneurs need a flexible business model that enables them not only to re-shape their strategic choices, but also to quantify them.
To achieve this objective, we suggest a new model called **Value Chain Tool (VCT)** and based on "co-innovation", which incorporates collaboration and co-creation among different stakeholders.
From the testing activity, we notice two different needs of companies: first, they have to generate the idea (ideation process) and validate it (validation); second, they want to draw up a bankable project.
Starting from these two different objectives, Value Chain Tool focuses on both needs:

- It encourages ideation and validation;
- It supports the redaction and creation of a proposal.

Testing activity demonstrated that innovation is fostered when new ideas can emerge and easily translate into socio-economic value.

As underlined in our research, companies are working in complex environments and open innovation is a must.

Our study focused on the creation of a Value Chain Tool oriented on open innovation and used by a small group of actors who are looking for cooperative projects.

Partners with complementary backgrounds, knowledges and skills will work together and will establish new value-chains. They can turn their ideas into sustainable and innovative products, processes or services that will address societal challenges and/or are highly competitive in global markets.

The proposed VTS's will help them to draw up a project ready for funding that clearly describes the market potential (potential users/customers and benefits for them; targeted European/global markets, etc.), the business opportunities for participants, measures to enhance the probability of eventual commercial take-up and a credible commercialisation strategy that identifies next steps and specifies other actors to be involved.

In table 4.1 we make a comparison between the Value Chain Tool and all the others presented in literature.

***Table 4.1 Comparison between Value Chain Tool and other VTS's***

| Similarities | Differences |
|---|---|
| Open Innovation | Quantitative Approach |
| Visual Mapping | Measurable KPI |
| Brainstorming | Oriented to ideation, validation and preparation of the bankable project |
| Qualitative Approach | |
| Oriented to the ideation and validation | |

As underlined in the table above, the solution proposed is the first one that encompasses intrapreneurship discovery for companies with a quantitative approach. The model shall provide a clear vision of the overall innovation projects, trying to figure out risks, merits, state of the art of the offer, value chain and what company is looking for.

The tool has been designed to ensure that the main aspects of the solution are presented in a way that will enable the company to write a project ready for funding with all the elements required.

The project should be clear, measurable, realistic and achievable; moreover, it should be consistent with the expectations of the investors.

The purpose of the proposed model is to get a good understanding of how far the company has already developed the project and at what stage is the project idea.

All the elements inserted in the 6 boxes represent the main contents requested for writing proposals. The aim of the Value Chain Tool has been to open new pathways for future research on business models and intrapreneurship discovery.

## 4.2 Characteristic and novelty of Value Chain Tool

The Value Chain Tool is structured in 6 different segments; each segment allows for project development and it is related to a specific key function: 1) identification of challenge, 2) identification of the value chains, 3) characterisation needs, 4) impact, 5) characterisation offer, 6) what is missing.

In each segment there can be a set of questions that will help the companies to write the project proposal.

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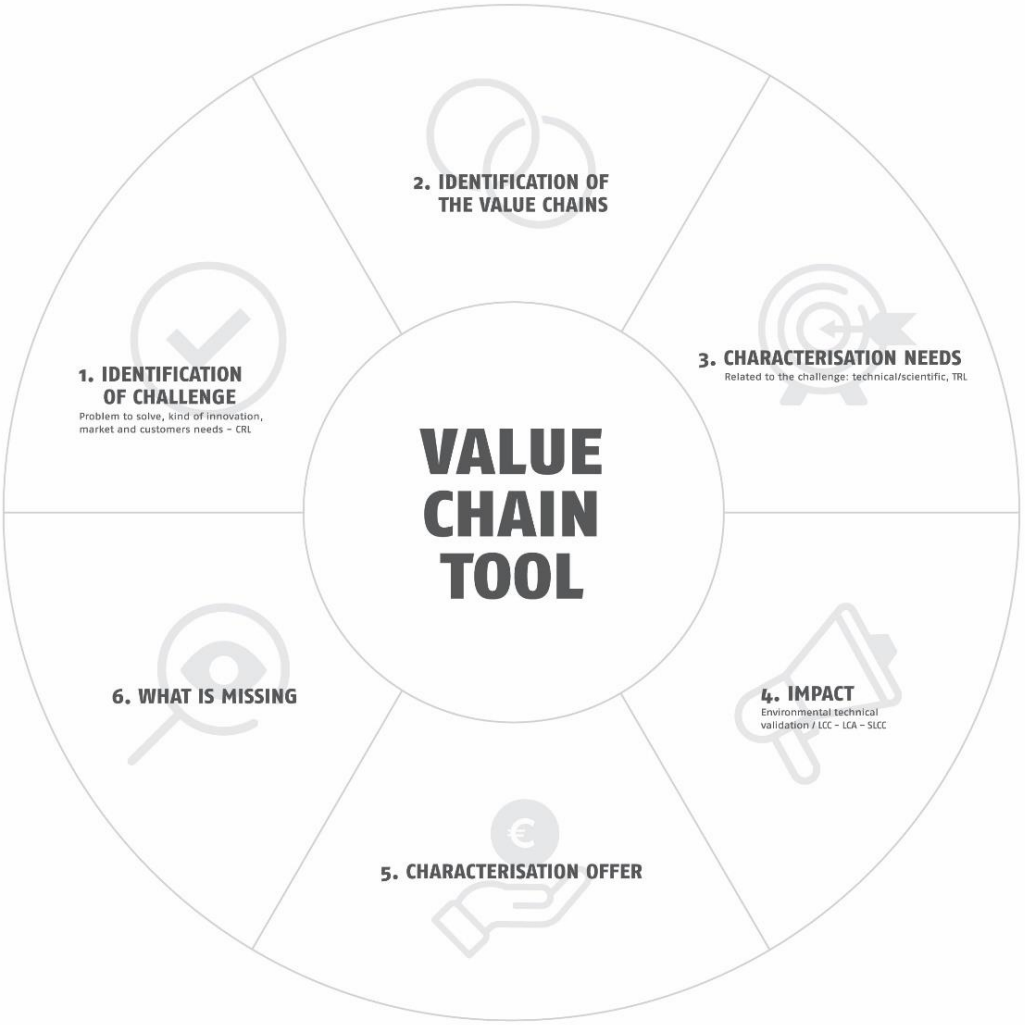


**TOPIC**

**PARTICIPANTS**

The innovation of the Value Chain Tool is the quantification of the boxes. For each box, there have been identified quantitative Key Performance Indicators (KPI's) that can measure the feasibility of the idea.

The terms KPIs was introduced for the first time in the literature by the Austrian scientist Peter Drucker (9) who suggested a set of metrics and indicators that could be used in business. However, this system became popular from the end of 1990s, when the complexity of the economic world was increasing [87].

KPI's are a tool for measurement; they are quantifiable metrics that reflect the technical, innovative, social and environmental performance of a company to achieve its goals or objectives.

KPI's help businesses to improve their strategies by linking various levels of the organisation (marketing department, sales department, production, business units and individuals) with clearly defined targets, bench market and stakeholders [88].

Moreover, the use of KPI's is important because the company can measure what it is really important for its business and it can also foresee if the solution respects the rules imposed by European Commission, for example in terms of sustainability or environmental impact [89].

To be effective, KPI's should respect following principles:

- Quantitative→ KPI should be measurable and should therefore be quantitative in nature;
- Relevance→ in addition to the quantitative information, each KPI is accompanied by a general description that explain impact and purpose;
- Comparability→ data reported by company A) shall be compared to data reported by company B); that means all companies reported data in the same format and each KPI adopts a common standard.

The choice of the KPI to be used in the VTS was not random but before deciding on the KPI, the organisation answered to specific questions, such as:

1) Can the data represent the technological and innovative impact of the organization?
2) Does the data support the management process of the organisation?
3) Is the data understandable without complicated explanation?
4) Will data in this format be usable by others?
5) Can the data be compared with relevant benchmarks for this aspect?

Although the intrapreneurship discovery is much more qualitative than quantitative, it has been highlighted **8** criteria for a more objective analysis of ideas. Since economic and financial data are not yet foreseeable or definable with certainty, the quantitative criteria are linked to the technologies who will be involved in the project.

The first box "***Identification of challenge***" is related to the solution. What is the problem the company has to solve? What kind of innovation?
First, the company has to identify if the innovation is in the product, in the process or both and to understand at what level is the proposal.
The innovation of product is the introduction of a new good; the innovation of process is a new method of production or in a new way of commercializing, distributing the product.
In the first case the innovation can be disruptive or sustaining. The theory of disruptive innovation was introduced for the first time by Clayton Christensen and Joseph Bower [90] in their studies and means a completely way to innovate, that radically change the use of the product or customer behaviours and creates a new market.
They replace older ways of doing things, making old skills and organisation models obsolete. These types of innovation happen very quickly, sweeping away their precursors in a short time period. They influence people, machine, products or services and there will be widespread.
An example can be the tv on demand, for example Netflix or Now TV that revolutionize the way people watch television or movies.
According to the McKinsey Global Institute [91], there are a set of technologies that could have a massive, economic and disruptive impact before 2025; Internet of Things, augmented reality or mobile internet are some of them.
On the contrary, sustaining innovation is an improvement of the product; the company has a product that works in the market, but it is in a mature phase. So, it decides to change some components to have a better quality of the final product. An example is the smartphone.
Once the type of innovation has been outlined, the company has to figure the value proposition, the competitive advantage of the innovation; it's the secret sauce of the company, something that allows for delivering the benefit to the customers with much greater effectiveness than any other competitors.
It is an element that will make very difficult to reach the same results for competitors; it can be a single component of the overall solution or a completely new approach, but in

both cases is the key factor that differentiates the product from all the others available in the market.

Here the question is "what makes the innovation so special"; it can be the customer service, the technology, the network effect, the user experience, the quality, the cost etc.

Some examples:

- Customer service→ Amazon Prime
- Network effect→ Linkedin
- User experience→ Apple

Once the company has clarified the type of innovation in which invest, they need to understand of how far they have already developed the solution proposed and if it really suits customers' needs.

Doing so, Customer Readiness Level, CRL [92] is the first criteria to be used. This KPI is particularly useful when end-users of a technology are different from the customers, the analysis of this dimension with 6 levels aims at exploring *consumers' readiness and need for the technology*. In other words, the CRL estimates the consumers' willingness to engage in the technology development, analyses their needs, routines, resources and abilities. In addition, the CRL explores consumers' contributions to the technology deployment.

With a ranking from 1-lowest to 9-highest, it evaluates the solution stages:

- CRL 1 – Hypothesizing on possible needs on market;
- CRL 2 – Identified specific needs in market;
- CRL 3 – First market feedback established;
- CRL 4 – Confirmed needs from several customers and/or users;
- CRL 5 – Established relations with target customers;
- CRL 6 – Benefits of the product testing and/or first test sales;
- CRL 7 – Customers in extended product testing and/or first test sales;
- CRL 8 – First product sold;
- CRL 9 - Widespread product sales.

The second one is the Market Readiness Level, MRL [93], a type of measurement instrument used to assess if the solution as being ready to go to market with useful, useable and used outputs. Whilst the purpose of achieving 'market readiness' is to develop a commercial offering for a group of customers, the concept can be successfully applied for developing a service offering for a group of users or stakeholders.

With a ranking from 1-lowest to 9-highest, it evaluates at what stage is the solution:

- MRL 1 – unsatisfied needs have been identified;
- MRL 2 – identification of the potential business opportunities;
- MRL 3 – system analysis and general environment analysed;
- MRL 4 – market research;
- MRL 5 – target defined;
- MRL 6 – industry analysis;
- MRL 7 – competitors' analysis and positioning;
- MRL 8 – value proposition defined;
- MRL 9 – product services defined;
- MRL 10- business model defined coherently.

The key innovative aspect of the tool is the combination of CRL and MRL; the synchronization of these two elements helps companies to reduce the risk to enter in a wrong market. In this section, the key questions for the manager are: is the market ready for the technology? Is the technology ready for the market? How to synchronize time and content of technology development and market development?
From this combination, we create a new KPI that is called Innovation Readiness Level (IRL).
The Innovation Readiness Level (IRL) tool has been developed by InnoEnergy with the purpose of assessing the level of maturity of an innovative product, service or emerging business [94].

The IRL can be divided in (10):

- From 1 to 2 the idea is undeveloped and no-one will invest in it;
- From 3 to 5 the idea will solve a real problem, it's focused and will provide something concrete and tangible to buyers or investors; at this stage there is a prototype or it will be develop soon and the hardest work is to have a clear statement of the solution, how it will work and what it will take to get it to the market;
- From 6 to 7 the idea is well structured and the company is finalizing the project;
- From 8 to 9 the solution is ready for the commercialisation.

Once innovation and customer are well defined, the company has to assess the market, analysing the added value of the innovation and why customers are willing to pay for it.
It also defines the type of markets, the target and the possible channels through which the value proposition will be delivered to the customers.
Companies need to be very accurate about the market where they are going to launch their products or their innovative solutions. To have a successful market strategy, they have to understand the *market segment* and figure out how to deal with all the challenges they will face.
For what concern the type of market, users should do a market segmentation to select the beachhead market.
The market size is important and it's possible to estimate it through two criteria [95]: sales volume- the amount of goods sold by quantity, here the market size is measured by single units (for example bottles of coca cola sold) or sales value- the amount spent by customers on the volume of goods, here the market size is measured by currency. In both cases the time frame is one year.
Through this calculation the company define the Total Available Market (TAM), so all the market that is possible to address [96]. The TAM is the result of:
TAM= N.Potential End Users × Revenues Each End User is Worth Per Year × Average Purchase

This is not the market segment but it is actually the total available one; from this it should be figured out the available market based on the solution proposed (Service Available Market- SAM) [97] and finally the realistic market share based on practical limits such as trends, competitions, forecasts, expected demands, sales, distribution channels or other influences (Fig. 4.2).


*Fig. 4.2 Market Segmentation*

The serviceable obtainable market (SOM) is the segment the company has to reach; in order to achieve this segment, it is important to show how much it costs acquire a customer, how much it costs service that customer, and how much the company will make from that customer over a lifetime.

It's important to have some great empirical evidence to show how the company will achieve growth within the SOM.

There should be forecast three different scenarios: Optimistic, Most Likely, and Pessimistic. In general, forecasting SOM greater than 10% is going to require a great deal of justification.

The suggestion is to forecast a pessimistic scenario; it will be easier to justify a growth rather than to explain a lack to the investors.

Once SOM is clear, the company should underline the market growth rate; it is the type of market achieved, for example a niche market instead a high-volume market, or a monopolistic one etc.

Instead of TAM, another criterial called Demand Readiness Level (DRL) [98] can be used to assess the maturity level of a particular innovation market demand.

It is a KPI that measures the potential innovation actor towards conceptualisation stage from market needs.

In a context of sustainable development, the DRL support companies in their research and innovation investment, trying to integrate the different needs of customers.

Once the market is clear, a *customer segmentation* should be done to define the targeted users of the final solutions. This will help companies to identify the main groups of individuals ready to pay for your solution.

Usually different information can be considered to define the main target. The most common ways in which businesses segment their customers are [99]:

- Demographic information such as gender, age, familial and marital status, income, education, and occupation;
- Geographical information which differs depending on the scope of the company. For localized businesses, this info might pertain to specific towns; for larger companies, it might mean a customer's city, state, or even country of residence;
- Psychographics such as social class, lifestyle, and personality traits;
- Behavioural data such as spending and consumption habits, product/service usage, and desired benefits.

Now the first box is complete and the company can pass to the second one "***identification of the value chains***"; in this box should be underlined all the stakeholders necessary for the development of the solution.

A value chain can be defined as the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final customers, and final disposal after use [100].

In this section companies underline partners to be selected for the business feasibility of the solution. They can be partners, sub-contractors, traders, exporters, suppliers, retailers but all play a key role for the success of the idea.

Value chains can be mapped and analysed using value chain analysis (VCA) which can include qualitative and or quantitative tools. There aren't fixed rules on which research approach is better but there are strong grounds for recommending that a qualitative approach is used first, followed (time and resources permitting) with a quantitative study. According to Hellin [101] the most widely used quantitative research tools are questionnaires. For what concern our research, we are at previous stage and at this stage the company does not have to classify and analysed the type of relations with the stakeholders, but it has only to mention all the partners necessary to make the business model effective: suppliers, retailers, transporters, wholesalers etc.

Usually actors along the value chain are not homogeneous, but they have different assets, skills, rights, preferences and in the proposal phase it should be necessary to differentiate them.
In this case the Value Chain Tool asked to think about all actors who are part of the value chain and named them.

Then there is the third box "***characterisation needs***". The model proposed should be applied when companies have a technological, environmental or a social challenge to solve. According to this vision, two different KPIs can be adopted.
The first one is the Technology Readiness Level, TRL (11). The company clarifies the level of the solution, where it is situated in the spectrum from "idea to application" or from "lab to market". To establish this position in the market, the company has to refer to TRL.
It is a type of measurement instrument used to assess the maturity level of the solution proposed. With a ranking from 1-lowest to 9-highest, it evaluates at what stage is the solution.
Where a topic description refers to a TRL, the following definitions apply, unless otherwise specified:

- TRL 1 – basic principles observed, scientific research is beginning and those results are being translated into future research and development;
- TRL 2 – technology concept formulated, basic principles have been studied and practical applications can be applied;
- TRL 3 – experimental proof of concept, analytical and laboratory studies are required to see if a technology is viable and ready to proceed further through the development process;
- TRL 4 – technology validated in laboratory, the proof of concept is ready;
- TRL 5 – technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies);
- TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies), the solution has a fully functional prototype or representation model;
- TRL 7 – technology prototype demonstration in operational environment;

- TRL 8 – technology system complete and qualified through test and demonstration, it's ready for implementation into an already existing technology or technology system;
- TRL 9 – actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space).

For what concern social need, the Societal Readiness Level (SRL) should be assess. The definition of SRL was promoted by the Innovation Fund of Denmark [102] and it analyses the level of social adaption of a particular product or technology, on the promoted innovation. It allows company to measure how societies are able to accept and integrate the solution proposed.

The SRL is between a range of 1 and 9; if the SRL is expected to be low, it is necessary a good plan to change and favour a societal transaction.

SRL is declined as following, where 1 is the lowest and 9 the highest level:

- SRL 1 – identifying problem and identifying societal readiness;
- SRL 2 – formulation of problem proposed solution and potential impact, expected societal readiness;
- SRL 3 – initial testing of proposed solution(s) together with relevant stakeholders;
- SRL 4 – problem validated through pilot testing in relevant environment to substantiate proposed impact and societal readiness;
- SRL 5 – proposed solution(s) validated, now by relevant stakeholders in the area;
- SRL 6 – solution(s) demonstrated in relevant environment and in co-operation with relevant stakeholders to gain initial feedback on potential impact;
- SRL 7 – refinement of project and/or solution and, if needed, retesting in relevant environment with relevant stakeholders;
- SRL 8 – proposed solution(s) as well as a plan for societal adaptation complete and qualified;
- SRL 9 – actual project solution(s) proven in relevant environment.

Solutions proposed can be divided according 3 main groups:

- SRL 1-3: it is the early stage of a proposal and include all the activities of testing and reflections about the general societal readiness towards the idea proposed; at this stage companies think about the involvement of relevant stakeholders and how to include them;

- SRL 4-6: here companies have already clarified the stakeholders to involve and described in more specific terms what type of impact the solution will have in the environment;
- SRL 7-9: here there is a structured plan for addressing the societal readiness om a practical level to gain impact, creating awareness and disseminating results.

The box number 4 is "***impact***" and is the most complex one. This is related on the expected impact of the solution/ innovation in terms of scientific, technological or environmental progress.

In this section companies should try to do a cost benefit analysis (CBA) [103].

Cost benefit analysis was introduced for the first time by the French engineer Jules Dupuit who used a basic concept that later become known as cost benefit analysis (12).

At the beginning, it was widely used to measure the value of different projects (especially government projects related to public policy and infrastructure). Nowadays a cost benefit analysis is suitable for any type of business setting.

In order to assess project feasibility, the financial model should do explicit assumptions about timing for cash flows, expected revenue, costs for the realization of the investment and the discount rate used.

If the CBA is complete, companies can achieve a concrete result that can be used to develop reasonable conclusions around the feasibility and/or advisability of the solution proposed.

There isn't a specific standard to do CBA, but usually it is possible to organise the methodology in 5 steps [104]:

1. Establish a framework to outline the parameters of the analysis;
2. Identify costs and benefits that will influence the solution development;
3. Calculate costs and benefits across the life of the project development;
4. Compare cost and benefits using aggregate information;
5. Analyze results and make an informed, final recommendation.

First the organisation should identify all possible costs associated to the project and make a list of these; costs include resources, human capital, training costs, logistics and so on.

Then benefits should be underlined and an estimation of both is necessary to do a comparison of the two values.

CBA allows organisations to verify that the benefits of the investment are more than costs and to select a solution rather than another one by comparing their benefits and costs ratio.

In this section companies should also consider the environmental validation of the technology; this validation can be done through different assessment.
One of this is Life Cycle Costing (LCC), a methodology that permit to estimate all the costs of the product life cycle, from inception to through engineering design and manufacture, to service and disposal of manufactured products. In an ideal proposal, LCC is used to quantify product performance and lifetime cost of ownership [105].
Another method is the Life Cycle Assessment (LCA); according to the International Standard ISO 14040 *"a life cycle assessment (LCA, also known as life cycle analysis, ecobalance) is a technique for an product related estimation of environmental aspects and impact; LCA assesses each and every impact associated with all stages of a process from cradle-to-grave (i.e., from raw materials through materials processing, manufacture, distribution, use, repair, maintenance, and disposal or recycling"* [106].
It is a decision support tool that ensure companies environmental and sustainable choice.
Moreover, it can be considered the Social Life Cycle Assessment (SLCA) [107]; it is a KPI that aims to assess the social and socio-economic aspects of products and their potential positive and negative impacts along their life cycle encompassing extraction and processing of raw materials; manufacturing; distribution; use; re-use; maintenance; recycling; and final disposal. SLCA assesses social and socio-economic impacts found along the life cycle (supply chain, including the use phase and disposal) with generic and site-specific data.
SLCA is an aspect that may directly affect stakeholders, positively or negatively during the life cycle of a product.

The process continues with box number 5 "***characterisation offer***": represents all the infrastructures, facilities, living lab, skills, competences already available in the ecosystem. Here the company underlines both internal and external factors that positive influence the proposal. The research demonstrated that this is the easiest part for participants, because they already know strengthens, weaknesses and what is available at the moment in the market.

The last box is the number 6 "***what is missing***"; in some way it can be considered as the result of the VTS. If the company rightly cover all the part, this section will automatically be complete. In this section comes out what the company is looking for. It can be an

economic support, a technological partner, a university that can implement the scientific research or an end user to test the solution developed.

In the Value Chain Tool there is also the section ***participants*** to identify the working group and what is the related ***topic***. According to the analysis done, we focused only in the main area related to the regional smart specialisation strategy.

## 4.3 Testing activity

Innovation and competitiveness are fundamental elements of the transition towards a circular economy in Europe [108]. On the one side, innovation is needed to realize the necessary systemic changes in this transition. On the other, the circular economy itself is regarded as a key driver for enhanced competitiveness, reducing the dependency on scarce resources with volatile prices and creating new business opportunities and innovative, more efficient ways of producing and consuming [109]. New business models, new technologies, and changes in entire production systems are required. Therefore, industry and SMEs need to adopt innovative solutions to achieve this change [110].

As demonstrated in previous chapters, VTS's are a method centred around open ended discussion of visual art. Although they encourage open-ended discussion, the method of instruction is actually highly structured.

According to this definition, in the research we tested Value Chain Tool inside a small group of companies to come out with a feasible solution.

Instead of all the other VTS's, the Value Chain Tool is more oriented on the preparation of a proposal to be submitted for European, national or regional projects.

Participants underlined possible opportunities and synergies, such as the creation of value chain for collaborative projects in a specific topic, or the implementation of common policy to spread circular economy among participants.

First, we tested it inside a small group of different companies to verify the possible development.

We printed the Value Chain Tool and we attached it at the wall. Participants narrow down their ideas in post it and they attached them to one of the six boxes of the model.

We worked as facilitators to guide them during the whole process.

The activity of testing began inside a small group of stakeholders set up in Marche Region. At first, we identified the participants. At the table took part 2 universities and 5 different companies, located in Marche Region.
The identified topic was the reuse and recycle of composite material (Fig. 4.3).

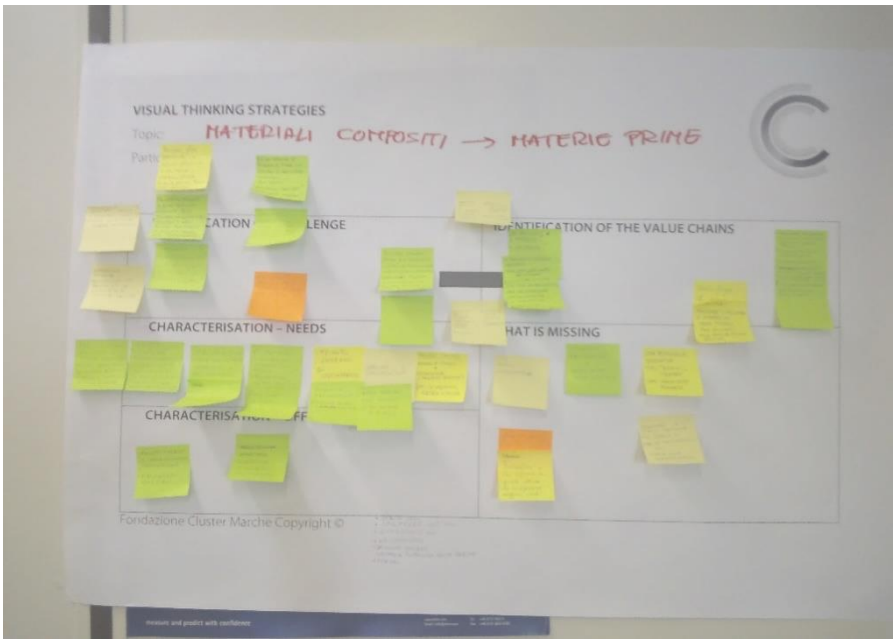


*Fig. 4.3 Working group of composite material*

Adopting a bottom up approach, the working group ***identified the main challenge***: the re-use and recycle of production waste, including the waste of composite materials coming from different manufacturing sectors. Since composite materials represent a cost for companies, the aim of the working group is to convert the costs in revenues. The added value of the solution proposed is that products can become smarter e.g., embedding sensors allowing the collection of information during the use phase. The introduction of industry 4.0 approaches, besides enabling circular economy, opens the way to the offering of new added-value services in the frame of innovative business models and allows more effective integration and synchronization of value chain partners that operate in a wider EU specialised network.
The idea is to re-design value chains in a logic of circular economy, providing benefits in terms of accessing critical raw materials, energy and resource consumption, etc. At the same time, it will make them smarter by contextually re-designing products-services to increase added value through the introduction of advanced technologies and solutions in products and processes.

The idea is to re-use at least 30% of composite materials, increasing the efficiency of re-manufacturing processes by at least 20%. We measured the solution proposed as reported in table 4.2.

*Table 4.2 KPI identification main challenge*

| KPI | Methodology |
|---|---|
| CRL 4 | During brainstorming participants have clear in mind customer's needs |
| MRL 6 | Specific and clear identification of industrial analysis |
| IRL 5 | From the mix of CRL and MRL, comes out a good idea for the re-use of composite material that is feasible and should be deeply studied |
| SOM: automotive, nautical, wind sector | Identification of the key market and accurate quantification of the market share |

Once the challenge was clear, we moved to the ***identification of the value chain***. Here companies identified all the actors that should be involved in the process. Who recovers the by-product? Who has the technology to chemically recover the composite material? What about regulatory issues? Who is taking care of Transport and/or authorisation issues? Who are the producers of waste? Who is going to manage the waste? Who is going to use the final recycled material?

Once identified all the possible actors to be involved, the working group focused on ***characterisation needs***.

First, it's important to raise the awareness on recycled product. There isn't a culture on this aspect and it's important to guide companies in this process. It is necessary to implement the culture of circular economy and reuse of composite material; there is a strong mistruth in the local manufacturing ecosystem toward green and sustainable practices. In table 4.3 we reported the KPI.

*Table 4.3 KPI characterisation needs*

| KPI | Methodology |
|---|---|
| TRL 5 | Study of the level of technology: the concept is that the already existing technologies applied for the reuse of composite materials are limited and expensive. In particular, the problem regarding the use of the technologies is about their high cost and at this time technology are validated at relevant environment |
| SRL 4 | Customers could be ready to adapt to the new technologies; for the moment the problem has been validated at pilot testing |

In ***characterisation offer***, companies underlined all their skills and capacities they can offer.

This is the analysis of the ecosystem in which companies are working; for example, all the infrastructures already established in the territory such as living lab, pilot plant. Here companies have to express their degree of knowledge about these facilities or what are the services they are still looking for- financial solutions, cooperative problems etc.

Here we have the partnership already established with European projects, all the composite materials they already produced and some infrastructures available in the territory (for example living lab already set up at Polytechnic University of Marche).

The main idea here is to establish a working environment which favours the cooperation among different sectors. Exchanging ideas, data and information among sectors for the setup of circular chains will enable also cross-fertilisation in terms of technologies, methods and strategies affecting manufacturing chains and having the potential to generate new businesses.

In ***what is missing*** companies identified the solution to the problem: the creation of a Pilot Plant for the treatment of mineral fibers, plastic resins and other composite plastic materials. All the identified materials cover a wide spectrum of uses in the different regional productive sectors.

The second group of stakeholders was composed by 1 university and 6 different companies set up in Marche Region.

The identified topic was the remanufacturing of products using more homogeneous materials (Fig. 4.4).

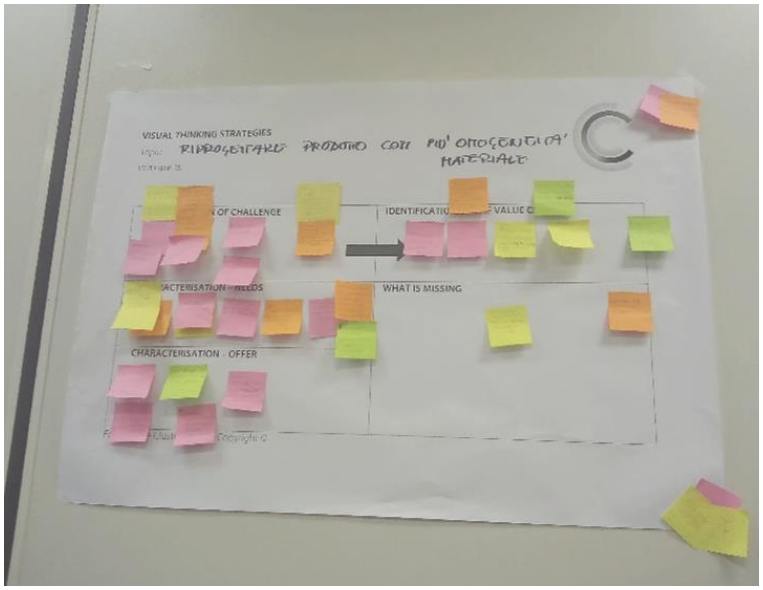


*Fig. 4.4 – Working group of remanufacturing with homogeneous material*

Adopting a bottom up approach, the working group ***identified the main challenge***: recovering, re-using and remanufacturing products using homogeneous materials. Companies focused on kitchen furniture; the main idea is to redesign glue that will be easily disassembly. A lot of tools and methods help designers to optimize the material selection based on technical, mechanical and economic criteria during the product design process as reported in table 4.4.

***Table 4.4 KPI identification main challenge***

| KPI | Methodology |
|---|---|
| CRL 5 | The main idea of the working group is to rebuild, repair and restore a product using materials more homogeneous; products should be easily disassembly, speeding up the destruction of parts during dismantling. Participants have already established relationship with potential customer, so the solution is at mature stage. |
| MRL 6 | A lot of tools and methods are available in the market to help designers to optimize the material selection based on technical, mechanical and economic criteria during the product design process. So, we ranked the solution at MRL 6 in the phase of industrial analysis |
| IRL 5 | The combination of CRL and MRL highlighted that the solution proposed will solve a real problem, it's focused and will provide something concrete and tangible to buyers or investors |
| SOM: furniture | The market identified is the furniture one |

Once the challenge was clear, we moved to the ***identification of the value chain***. Here participants mentioned a research center for the study of materials and processes; a study of consultancy that analyse glues and find a way to easily disassembly the furniture; manufactures of semi- finished products.

In the ***characterisation needs*** the working group began with the problem of glues. They need to find glues that can be easily removed; the solution has been measured as discussed in table 4.5.

***Table 4.5 KPI characterisation needs***

| KPI | Methodology |
|---|---|
| TRL 5 | According to the working group at the moment there are some research centers that are studying new glues that can be easily removed. These glues are tested only in laboratory |
| SRL 5 | The working group has clearly in mind what type of stakeholders involved and if they find new types of glues, the final product will be easily sell in the market |

In ***characterisation offer,*** companies underlined all their skills and capacities they can offer. In the territory there is already a research centers for the study of materials to be used in the process; they have already contacted some manufacturing companies that offer they semi-finished products; they can also offer new eco-sustainable materials, such as cork or wood.

The box ***what is missing*** underlined that the solution proposed is a mature phase and ready to be developed. Components of the working group had all the competences required to develop a new product with the characteristics required. The only thing that can support and give more strength to the solution is a laboratory who could certify the final product.

Another working group develop the concept of "product as a service"; it is one of the major trends in the transition from a linear economy to a circular one. All the largest industries, for example Boing or IKEA, are moving towards this new business model and they are launching in the market products design with the aim of providing services [111].

For example, a customer who joins a car sharing service doesn't have to worry about maintenance of the car; for what concern IKEA is set to start leasing furniture, signalling one of the most significant shifts from its traditional model for decades.

This working group was composed by 4 companies and 1 research and technological center specialised in certification and quality tests in laboratory.

The working group classifies the topic product as a service as reported in Fig. 4.5.

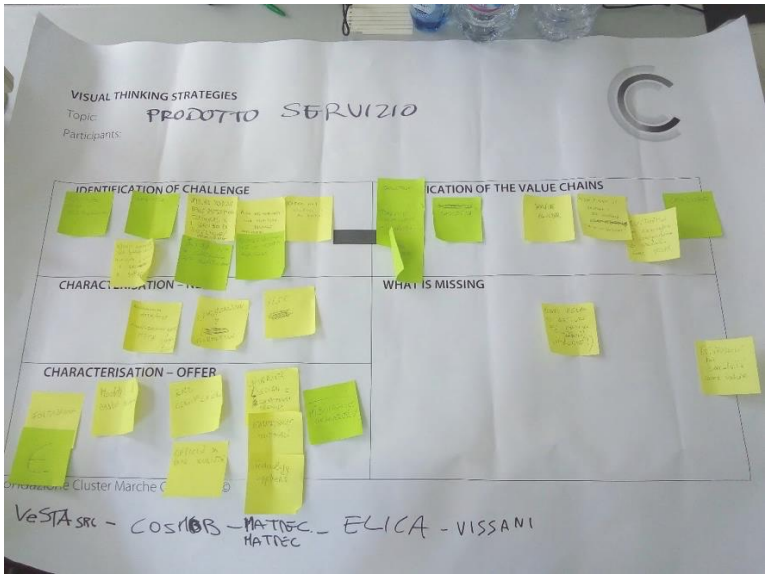


*Fig. 4.5 Working group Product as a service*

Adopting a bottom up approach, the working group ***identified the main challenge***: the product is kitchen, understood as a room, with all furniture that will be rented.

The main challenges to face are the logistics; new business models for the management of materials or semi-finished products; IoT and digitalised systems for monitoring and control furniture; services for revamping or for customised products. The solution has been classified in table 4.6.

***Table 4.6 KPI identification main challenge***

| KPI | Methodology |
|---|---|
| CRL 4 | According to participants to the working group, customers are more and more looking for solutions that combine the concept of product as a service; they need models that offer tangible and intangible elements together |

| | |
|---|---|
| MRL 7 | A lot of tools and methods are available in the market to start to investigate what are doing their competitors |
| IRL 5 | The combination of CRL and MRL highlighted that there is a real need of customers to look for more personalised solutions with higher value, not only tangible |
| SOM: All consumers | Consumers that want to play an active role in making the circular economy a reality, and the aim of the working group is to facilitate that by developing new business models in relation to how they acquire, care for and pass on products |

Once the challenge was clear, we moved to the ***identification of the value chain***. Here participants mentioned suppliers, manufacturer or kitchen assemblers, supplier of raw materials, experts for the management of leasing, institutions that can spread the concept of circular economy and raise awareness among consumers or potential users.

In the ***characterisation needs*** the working group mentioned the Mean Time To Failure (MTTF) [112] a very basic measure of reliability used for non-repairable systems. It represents the length of time that an item is expected to last in operation until it fails. For the participants, a machine that does not produce the number of pieces desired, even if is still running and working, it has failed. In order to define the failure, company has to consider the hours spent on maintenance, the number of breakdowns and the operational time (that can be calculated from total expected operating hours per week and total equipment downtime) [113]. The aim of the solution proposed is to reduce at minimum this period of time and here the participants underlined as well as the need of an institution who certificates the quality of the product.

***Table 4.7 KPI characterisation needs***

| KPI | Methodology |
|---|---|
| TRL 7 | There is a first prototype that operate in the environment; a first product created by one of the partners and that can be implement and launch in the market |
| SRL 6 | The working group has clearly in mind what type of stakeholders involved and the environmental benefits achieved |

In ***characterisation offer***, companies underlined all their competences in terms of materials to be used, of new business models to be adopted and all the skills of technology suppliers that are available to take part in the project. The solution is matured and participants already have the competences and skills required to create a good project proposal.

The box ***what is missing*** came out with the necessity of a new employee who can manage the leasing of furniture. It is also necessary an institution or some policy that raise awareness on circular economy.

The last working group worked on the concept of industrial symbiosis; the topic came out from the working group was related to a platform for the exchange of competences and expertise. To the table participated 3 companies and 1 university.

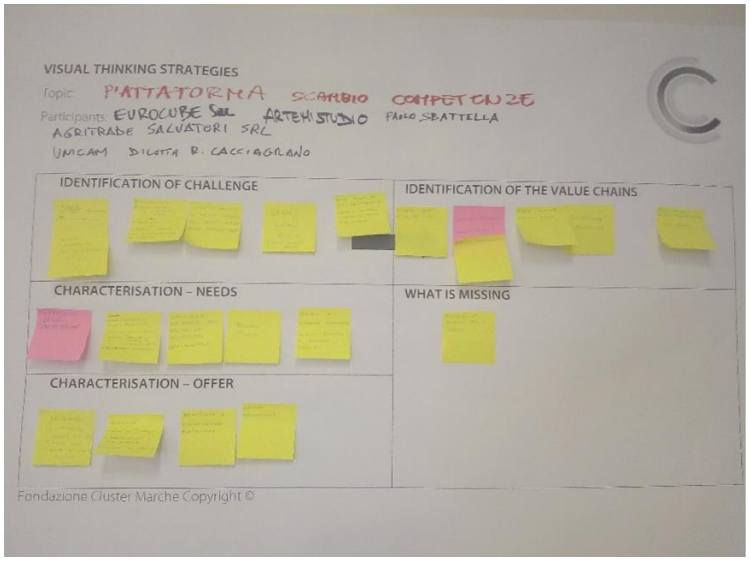


*Fig. 4.6 Working group Platform for exchange of competences*

***The main challenge*** is called "networked manufacturing": a platform for sharing experiences and skills, which uses data flows to drive better communication, co-ordination, and control in and around manufacturing has the potential to secure competitiveness. As explained in chapter 2, the introduction of industry 4.0 inside companies changed paradigms. In this sense, this new approach can be used to boost communication and integration between different stakeholders.

*Table 4.8 KPI identification main challenge*

| KPI | Methodology |
|---|---|
| CRL 3 | Completely new solution and approach; participants have received a first feedback from customers, but they have to keep going with the activity to understand their interest |
| MRL 4 | Participants need to do marketing research to verify if there is a real interest in the market and if companies are available to take part in this project |
| IRL 3 | The combination of CRL and MRL highlighted that the solution can solve a problem but it's still in a phase that should be carried out |
| SOM: to be defined | The evolution of the market and the topic of sharing expertise has a great potential but this issue is still difficult to be developed, because there are several cultural barriers to be overcome |

In the ***identification of the value chain*** participants mentioned all possible stakeholders who can be interested in sharing their expertise: manufacturing companies, logistic companies, suppliers, technology providers, coworking, end users and so on.

In the ***characterisation needs*** the working group started with a need of understanding the state of the art. So, what are the main competences or expertise available in the market? There should be an institute who can do this mapping. It is also necessary the application of artificial intelligence and big data to collect and analyse data and put it in this platform.

*Table 4.9 KPI characterisation needs*

| KPI | Methodology |
|---|---|
| TRL 5 | It is necessary the application of artificial intelligence and big data to collect and analyse data and put it in this platform: technology should be validated in laboratory |
| SRL 4 | The working group has to validate the problem through pilot testing in relevant environment |

The box ***what is missing*** underlined the need to find available companies for the activity of testing.

## 4.4 What we have learned

The activity of testing demonstrated that Value Chain Tool can be applied in a small group of participants with different background and skills; they should have a common topic of interest or a common problem to be solved. The aim is to aggregate different stakeholders and create a new value chain.

Based on the concept of open innovation, the Value Chain Tool captures additional new ideas that may lead to improving the performance of the business.

The tool can be used by companies with different dimensions or backgrounds, research centers and universities. As for all the other VTS's, it is necessary a facilitator who guide participants from the idea generation to the stage of intrapreneurship.

As presented in fig. 4.2, Value Chain Tool has 6 boxes but during the testing activity we did not work on box nr. 4 "impact". In this box it should be quantify criteria such as LCA or LCC, that are necessary to develop a new project. To launch a new product or service, such KPIs can not be avoid. Environmental impact is relevant for the future marketing or costs structure of a product, and nowadays it's almost mandatory to have an analysis of such indicators. However, Value Chain Tool is used by companies to ideate and validate ideas, and at this stage it's not necessary to measure these KPIs.

When we created the Value Chain Tool, we organised content in a square. After testing activity, we underlined that the main goal of the tool is to create new value chains. According to this concept, we thought that value chains are related to a circular concept, that could represent circular, sustainable or regenerative value chains. A circular tool promotes the concept of a continuous improvement process, that retains and maximises the value of the intrapreneurship discovery process. The tool helps firms to create and optimize value chains for designing the best possible industry network. It also aims to evaluate effects on value creation and to integrate complementary competences of different stakeholders that will be involved in the project. After these considerations, we realised a flexible circular tool, that points out KPIs and indicators and requires entrepreneurs to process information quickly, make rapid decisions and act faster than competitors do.

If the value chain becomes concrete, companies will work on such KPIs in the redaction phase of a bankable project.

From the testing activity, we underlined that the model is particularly useful to:

- Overcome a technical need;
- Identify all the key partners necessary to develop the product;

- Create a community among the service provided;
- Identify technical/business experience and skills of the team;
- Describe in a realistic and quantified way how the innovation has the potential to scale-up the applicant companies.

The VTS can be consider a pioneer one, as well as for Business Model Canvas or Translucent Innovation. At the moment there aren't in literature extension of this VTS but on the contrary is the first one who introduce the concept of KPIs. In table 4.10 we compared the Value Chain Tool with the other pioneers.

***Table 4.10 Comparison between Pioneers VTS's***

✖ | **insufficient/unprofitable** ◆ | **sufficient** ✓ | **excellent**

| Pioneers VTS's | Clear Definition of Solution | Definition of technological needs | Risk analysis | Easy to use | Applicable to all type of companies | Customer focused | Quantitative Methodology |
|---|---|---|---|---|---|---|---|
| **Business Model Canvas** | ✓ | ◆ | ✖ | ✓ | ✓ | ✓ | ✖ |
| **Translucent Innovation** | ✓ | ✓ | ◆ | ✖ | ✓ | ✓ | ✖ |
| **VTS** | ✓ | ✓ | ◆ | ✓ | ✓ | ✓ | ✓ |

From the critical analysis it is possible to underline that the Value Chain Tool not only has a quantitative methodology, but it's easy to use and compared to all the others gives better results. It can be applied to all type of businesses, but it also allows for creating a value chain that will work in consortium to prepare a project ready for financing.

Value Chain Tool illustrates a modernised version of doing projects, validating value chains and attributing a series of activities that capture the customer's feedback and help companies to make decisions about new product functionalities. Using both qualitative and quantitative techniques customer response is matured and the information gathered may provide specific learning that serves to validate or reject the hypotheses proposed and to keep going with the constitution of the value chain or not.

# CHAPTER 5
# CONCLUSION

In the last decades of the twentieth century a radical change occurred in the companies strategies, since to be able to survive in an increasingly competitive environment, companies needed to adapt and change both the products and services they offer – innovation in product - as well as the manner in which these are produced and delivered to the market –process or technological innovation. Those organisations, which operate in turbulent environments, should put greater emphasis on the exploration or creation of knowledge through strategies and innovation in products, services, technologies, and/or production processes.

Trends such as industry 4.0 or the circular economy drive companies to intensify their research, development, and innovation activities in search of technological and competitive improvement.

The research demonstrated that in the last years companies have changed the path: innovation is not only related to internal factors of the company, but it is a mix of internal and external factors. More and more companies are moving to an open innovation, influenced also by other companies who can take part to the process or to the product development. According to this path, entrepreneurs need to have a well-defined and structured strategy to achieve their goals.

There is a change in their mentality; they are looking for a more customer- centred model, that allow them to re-evaluate their value proposition and to achieve their customers in the right moment, with a successful product.

This process is called intrapreneurship discovery: it is a flexible, well-structured methodology based on design thinking that enables them to re-shape their strategies according to all the actors that affect the process.

According to our research, the tools used for this process are called Visual Thinking Strategies, VTS's, that represent a unique opportunity to valuate firm configuration effects. Thanks to this structured methodology, companies are not lost anymore in their innovation processes.

The research demonstrated that intrapreneurship discovery is a model useful for all type of companies but this study focused only in companies with specific characteristics.

According to the study, the research focused only in companies set up in Marche region and operate in sustainable manufacturing or mechatronics sector.

In the empirical study, we defined the regional contest in which we operated. We created an online survey and we collected 151 answers manufacturing companies that represent the 34% of that universe at the regional level. The survey underlined the main criteria that influences companies in their decision processes.

First, innovation should be considered as a crucial element to increase revenue and companies should invest in R&D at least more than 5% of the annual turnover to be competitive in the sector.

Second, companies need a structured and organized methodology to really face disruptive innovation. Without a defined approach they get lost and do not achieve the objective.

Third, human capital and a well-organized top management play a key role to organize the innovation process.

Once the context was clear, it started the testing activity as discussed in chapter 3. VTS's are the tools used to understand the feasibility of the innovation and to support the entrepreneur in the decision process. Often entrepreneurs have to make choices to guarantee higher production level and be competitive; sometimes a wrong choice can be the reason of a bankruptcy.

The testing activity showed that VTS's can be applied to all types of companies; it's not the dimensions or the fields of activity that influence the process.

The results of the testing activity demonstrated the role of VTS's; without them, the company risks following a wrong strategy and to spend money without a real income.

As far as the theoretical implications are concerned, the paper suggests that a crucial characteristic of companies, that guarantee a successful strategy, is culture and awareness of VTS's: companies usually work for tasks, following traditional rules and methods. The approach used, in this sense, is completely new and works outside the traditional norms. Companies are stimulated to take the risk to think outside the box and move towards higher degree of externally oriented collaboration for innovative development.

From a practical standpoint, the case study described the support offer to managers in their innovation processes, with a picture of the adoption of the VTS's to validate their ideas.

Nevertheless, several limitations occurred as soon as the models were tested inside companies. Companies figured out two problems: first, their need to quantify results, second a gap between the VTS's proposed and the project proposal to be written.
The research tried to solve this problem through the creation of an innovative model for open innovation and co-creation called Value Chain Tool.
This activity required a deep understanding and learning about KPI, company's behaviour and needs. The Value Chain Tool introduced some KPI to successfully measure the impact of the proposed idea and also support company in the redaction of a bankable project.

Therefore, a testing activity was done in different groups of stakeholders, composed by companies, universities and research centers to verify the feasibility of the tool.
From this activity we underlined a strong need of companies to be supported in their ideation and validation process; they have to identify the main stages of the idea, defining a common strategy to validate it. The answer to this project is intrapreneurship discovery: it combines agile and lean principles and accelerate product development, minimizing the expenditures of resources and rising the creation of value for customers.

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## Website

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5) https://leanstack.com/leancanvas
6) https://medium.com/ghostories/how-to-use-the-melt-frame-efdeb38761f4
7) https://www.designcouncil.org.uk/news-opinion/what-framework-innovation-design-councils-evolved-double-diamond
8) https://www.alexandercowan.com/venture-design/
9) https://kpi.org/KPI-Basics
10) https://blog.theentrepreneursadvisor.com/2017/10/innovation-readiness-level/
11) https://www.nasa.gov/directorates/heo/scan/engineering/technology/txt_accordion1.html
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# Appendix A.

## List of companies for testing

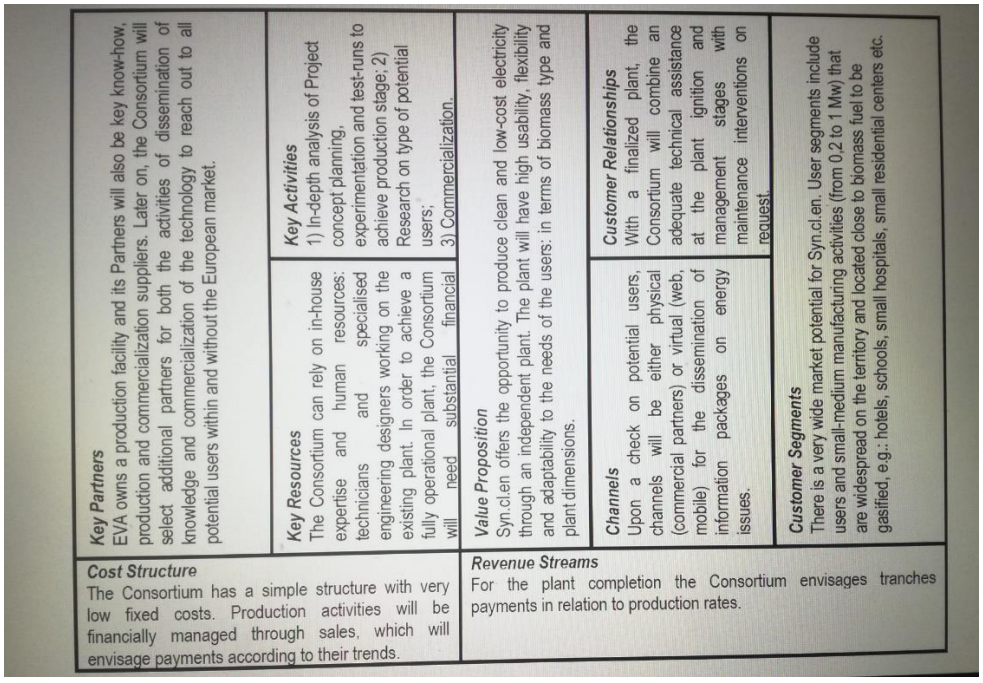
In the table below, we listed all companies, universities and research centers in which we tested the VTS's studied. We would like to thank all of them to share with us their data and to allow the development of this research.

| | Company | Website | Dimension |
|---|---|---|---|
| 1. | eTa Blades | https://www.etablades.com/ | Medium |
| 2. | HSD | https://www.hsd.it/home.asp | Large |
| 3. | Cantori | https://www.cantorialluminio.it/ | Medium |
| 4. | Zannini | http://www.zannini.com/sp/en/home.3sp | Large |
| 5. | Hyperlean | https://hyperlean.eu/ | Start up |
| 6. | Vetro Marche | http://www.vetromarche.it/ | Small |
| 7. | Hsign | http://www.hsign.it/ | Small |
| 8. | Sailmaker | http://www.sailmakerint.com/ | Small |
| 9. | Belloni Impianti | http://www.belloni.it/ | Medium |
| 10. | Nano Tech Projects | https://www.ntpsrl.biz/ | Small |
| 11. | CIC | http://www.componentinnovativi.com/azie da/ | Start up |
| 12. | Aditech | http://www.aditechsrl.com/ | Small |
| 13. | Dinets | http://www.dinets.it/sp/it/home.3sp | Small |
| 14. | Nova Tecno Stampi | https://www.novatecnostampi.it/ | Medium |
| 15. | Leaff Engineering | https://www.leaff.it/ | Small |
| 16. | Imar | https://www.imarsrl.com/ | Medium |
| 17. | Teknomac | http://www.teknomac.it/ | Medium |
| 18. | Manufacturing Technology Center (MTC) | http://www.the-mtc.org/ | Research Center |
| 19. | Bora | http://www.bora-italy.eu/index.php/it/ | Medium |
| 20. | AV Consulting | https://www.avconsultingitalia.com/ | Small |
| 21. | Generma | https://www.generma.com/ | Start up |
| 22. | Logical System | https://www.logicalsystem.it/it/ | Medium |
| 23. | Delta Plados | https://www.pladostelma.com/it/ | Medium |
| 24. | Loccioni | https://www.loccioni.com/it/ | Large |
| 25. | Schnell | https://www.schnell.it/it/ | Large |
| 26. | Alci Group | https://www.alcigroup.it/ | Medium |
| 27. | Biesse | https://www.biessegroup.com/it/ | Large |
| 28. | Vesta | http://www.vesta-corporate.com/ | Small |
| 29. | Profilglass | https://www.profilglass.it/ | Large |
| 30. | Proel Lab | https://www.proel.com/index.php?route=i ormation/news&news_id=140 | Medium |

| | | | |
|---|---|---|---|
| 31. | Cadland | https://www.cadland.it/ | Small |
| 32. | Simonelli Group | https://www.nuovasimonelli.it/it/ | Large |
| 33. | Advanced Mechanica Solutions | http://www.ams-italia.it/ | Small |
| 34. | Aidos System | http://aidos-systems.com/index.html | Small |
| 35. | Antos | http://www.antos.it/azienda/ | Small |
| 36. | 3P Engineering | https://www.3pengineering.it/it/ | Small |
| 37. | Cedrat Technologies | https://www.cedrat-technologies.com/es/ctec.html | Large |
| 38. | EN4 | http://www.en4.it/ | Small |
| 39. | VICI & C. | https://www.vicivision.com/ | Small |
| 40. | ULMA Embedded Solutions | http://www.ulmaembedded.com/ | Medium |
| 41. | Eurosuole | http://www.eurosuole.com/www/ | Medium |
| 42. | Matrec | https://www.matrec.com/ | Small |
| 43. | HP Composites | https://www.hpcomposites.it/ | Large |
| 44. | Ape Design | https://apedesign.eu/ | Small |
| 45. | DC Projects | https://www.dcprojects.com.au/ | Small |
| 46. | Centro Ricerche Creativo | https://www.startupinnovative.org/startup/ntro-ricerche-creativo-s-r-l/ | Start up |
| 47. | Eurocube | http://www.eurocubesrl.eu/ | Small |
| 48. | Elica | https://elica.com/IT-it | Large |
| 49. | Vissani | https://www.vissanimacchine.com/ | Medium |
| 50. | Artemistudio | http://www.artemistudio.it/ | Small |
| 51. | Agritrade Salvatori | http://www.apimai.org/node/42 | Small |
| 52. | University of Urbino | https://www.uniurb.it/ | University |
| 53. | University of Cameri | https://www.unicam.it/ | University |
| 54. | University of Macera | https://www.unimc.it/it | University |
| 55. | University of Ancona | https://www.univpm.it/Entra/ | University |

# List of case study

| *Key Partners* | *Key Activities* | *Value Proposition* | *Customer Relationships* | *Customer Segments* |
|---|---|---|---|---|
| #**Raw material suppliers**<br>• 3M<br>• Pandolfo Aluminum Spa<br>#**Distributors**<br>• Garofoli<br>• Vignoni<br>• Promo<br>• Tecknica Legno<br>• 2DV Costruzioni<br>• Lualdi spa<br>• DGT<br>• Simone Subissati Architects | #Window optimisation<br>#Industrial scale-up<br>#Glass manufacture<br>#Window assembly process optimisation<br>**Key Resources**<br>#Glass manufacture & assembly plant<br>#Operational pilot buildings<br>#Sales network | #High thermal insulation<br>#Low product cost<br>#Environmentally friendly<br>#High durability<br>#Easier to clean | #Long term contracts<br>#Trust<br>#Collaborative innovation<br>#Word of mouth generation<br>**Channels**<br>#Dedicated sales team<br>#Through contractors<br>#Retail stores<br>#Architects<br>#Contruction companies | #Construction companies<br>#Builders<br>#Architects<br>#Window specialists<br>#Building supplies retailers |
| **Cost Structure**<br>#Personnel<br>#Raw materials acquisition<br>#Product promotion | | | **Revenue Streams**<br>#Direct sales (Vetro Marche)<br>#Licensing royalties (CIC) | |



***Key Partners***
EVA owns a production facility and its Partners will also be key know-how, production and commercialization suppliers. Later on, the Consortium will select additional partners for both the activities of dissemination of knowledge and commercialization of the technology to reach out to all potential users within and without the European market.

***Key Activities***
1) In-depth analysis of Project concept planning, experimentation and test-runs to achieve production stage; 2) Research on type of potential users; 3) Commercialization.

***Key Resources***
The Consortium can rely on in-house expertise and human resources: technicians and specialised engineering designers working on the existing plant. In order to achieve a fully operational plant, the Consortium will need substantial financial

***Value Proposition***
Syn.cl.en offers the opportunity to produce clean and low-cost electricity through an independent plant. The plant will have high usability, flexibility and adaptability to the needs of the users: in terms of biomass type and plant dimensions.

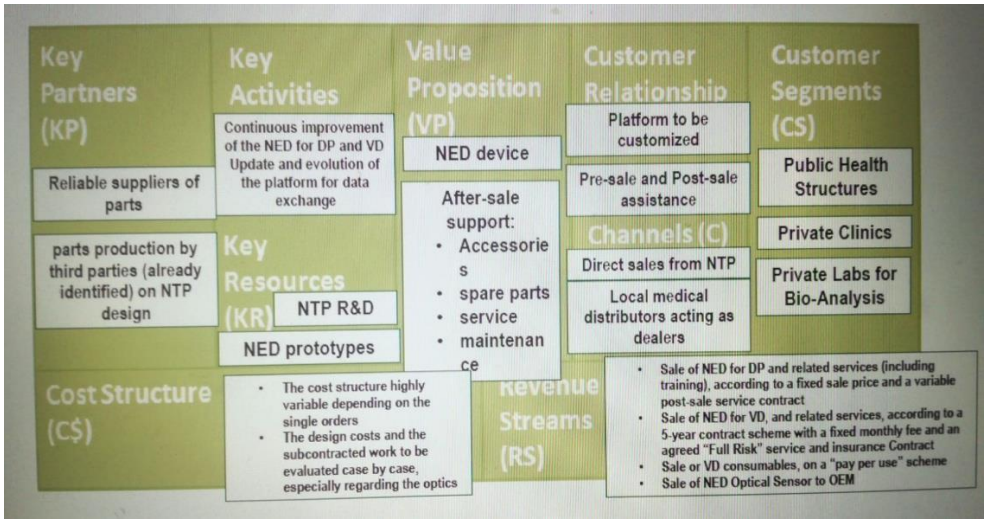
***Customer Relationships***
With a finalized plant, the Consortium will combine an adequate technical assistance at the plant ignition and management stages with maintenance interventions on request.

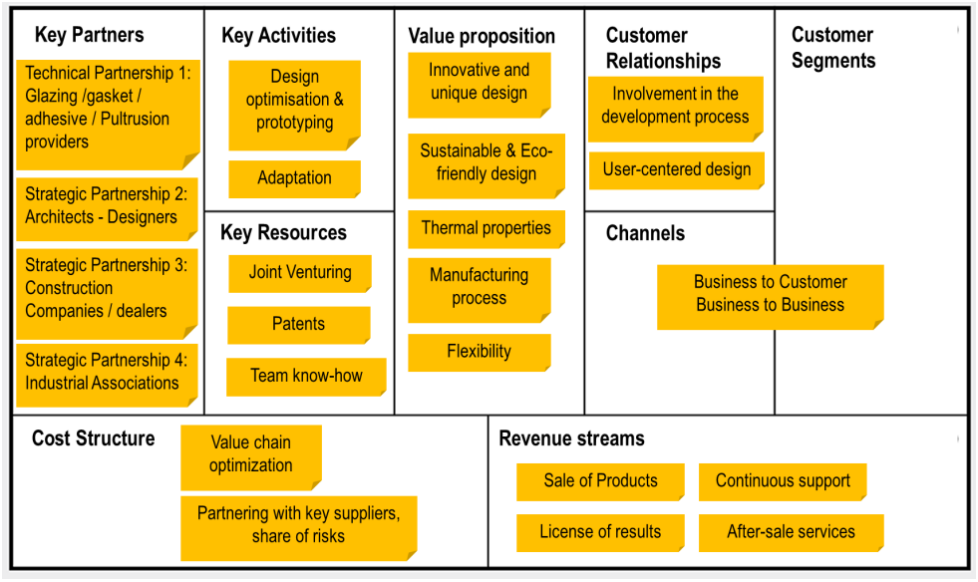
***Channels***
Upon a check on potential users, channels will be either physical (commercial partners) or virtual (web, mobile) for the dissemination of information packages on energy issues.

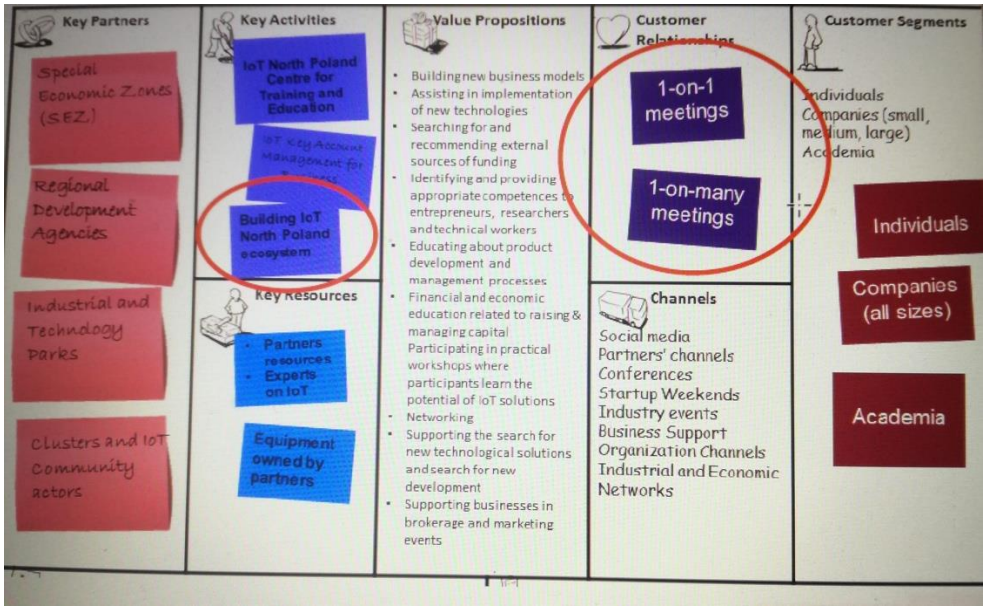
***Customer Segments***
There is a very wide market potential for Syn.cl.en. User segments include users and small-medium manufacturing activities (from 0.2 to 1 Mw) that are widespread on the territory and located close to biomass fuel to be gasified, e.g.: hotels, schools, small hospitals, small residential centers etc.

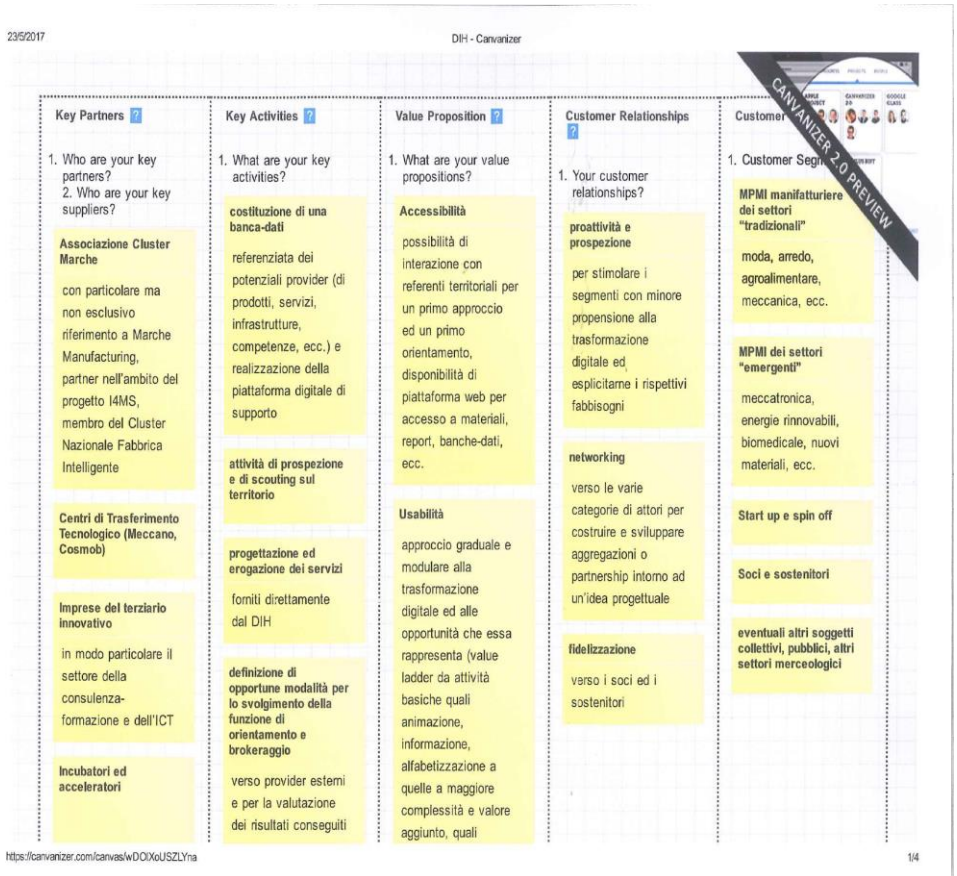
***Cost Structure***
The Consortium has a simple structure with very low fixed costs. Production activities will be financially managed through sales, which will envisage payments according to their trends.

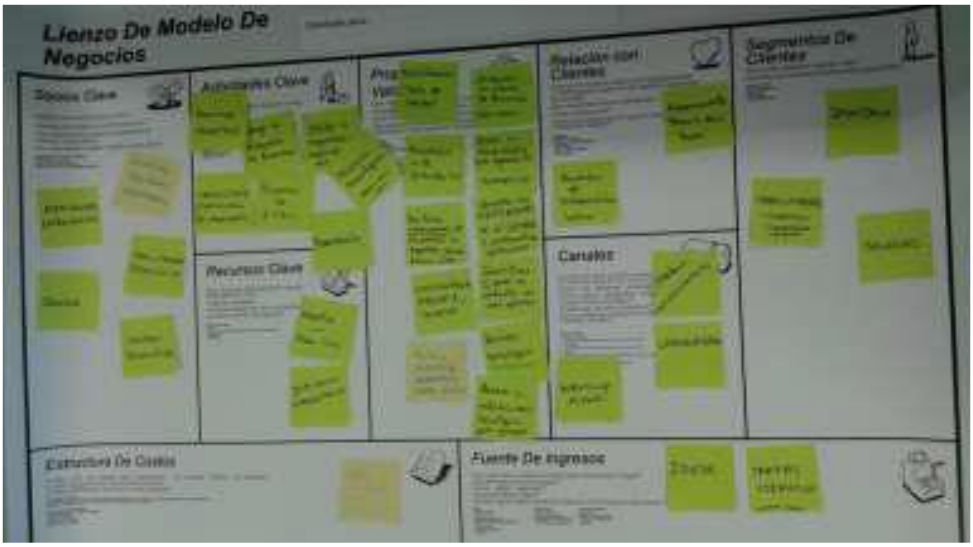
***Revenue Streams***
For the plant completion the Consortium envisages tranches payments in relation to production rates.

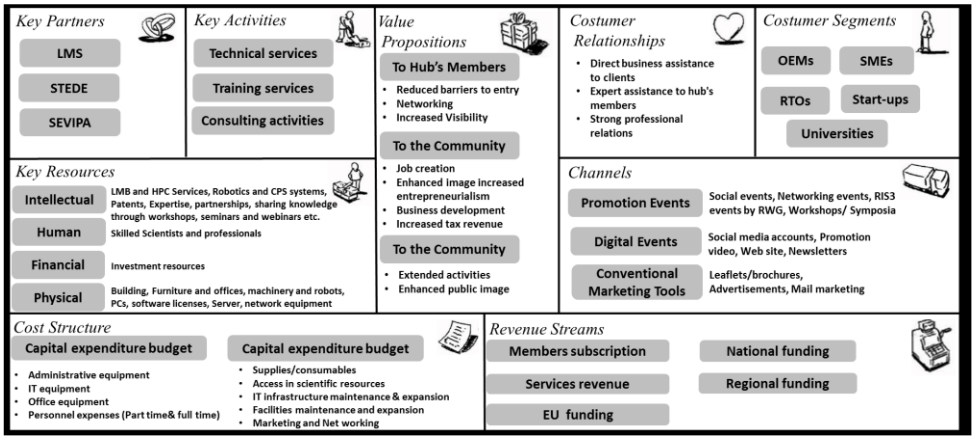

Key Partners (KP)
Reliable suppliers of parts
parts production by third parties (already identified) on NTP design
Key Activities
Continuous improvement of the NED for DP and VD
Update and evolution of the platform for data exchange
Key Resources (KR)
NTP R&D
NED prototypes
Value Proposition (VP)
NED device
After-sale support:
Accessories
spare parts
service
maintenance
Customer Relationship
Platform to be customized
Pre-sale and Post-sale assistance
Channels (C)
Direct sales from NTP
Local medical distributors acting as dealers
Customer Segments (CS)
Public Health Structures
Private Clinics
Private Labs for Bio-Analysis
Cost Structure (C$)
The cost structure highly variable depending on the single orders
The design costs and the subcontracted work to be evaluated case by case, especially regarding the optics
Revenue Streams (RS)
Sale of NED for DP and related services (including training), according to a fixed sale price and a variable post-sale service contract
Sale of NED for VD, and related services, according to a 5-year contract scheme with a fixed monthly fee and an agreed "Full Risk" service and insurance Contract
Sale or VD consumables, on a "pay per use" scheme
Sale of NED Optical Sensor to OEM

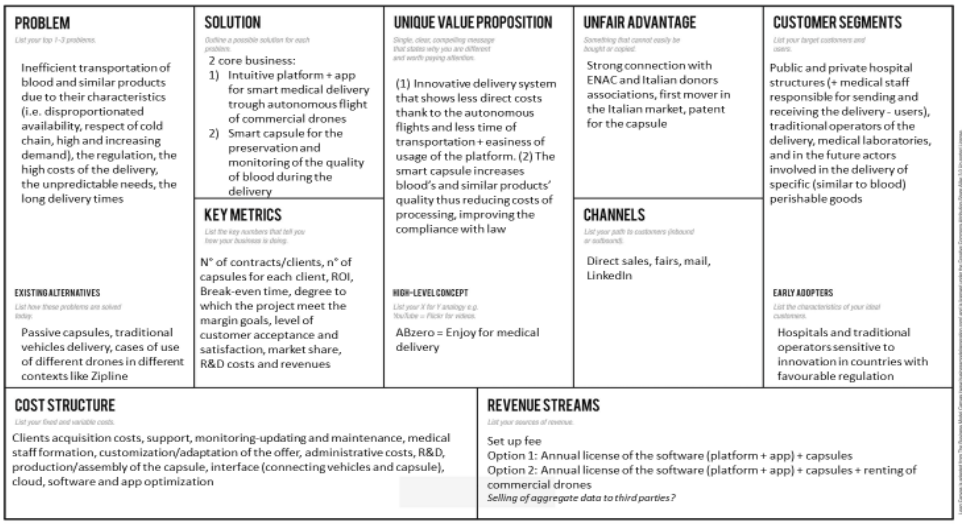

Key Partners
Technical Partnership 1: Glazing /gasket / adhesive / Pultrusion providers
Strategic Partnership 2: Architects - Designers
Strategic Partnership 3: Construction Companies / dealers
Strategic Partnership 4: Industrial Associations
Key Activities
Design optimisation & prototyping
Adaptation
Key Resources
Joint Venturing
Patents
Team know-how
Value proposition
Innovative and unique design
Sustainable & Eco-friendly design
Thermal properties
Manufacturing process
Flexibility
Customer Relationships
Involvement in the development process
User-centered design
Channels
Business to Customer
Business to Business
Customer Segments
Cost Structure
Value chain optimization
Partnering with key suppliers, share of risks
Revenue streams
Sale of Products
Continuous support
License of results
After-sale services


Key Partners
Special Economic Zones (SEZ)
Regional Development Agencies
Industrial and Technology Parks
Clusters and IoT Community actors
Key Activities
IoT North Poland Centre for Training and Education
Building IoT North Poland ecosystem
Key Resources
Partners resources
Experts on IoT
Equipment owned by partners
Value Propositions
Building new business models
Assisting in implementation of new technologies
Searching for and recommending external sources of funding
Identifying and providing appropriate competences to entrepreneurs, researchers and technical workers
Educating about product development and management processes
Financial and economic education related to raising & managing capital
Participating in practical workshops where participants learn the potential of IoT solutions
Networking
Supporting the search for new technological solutions and search for new development
Supporting businesses in brokerage and marketing events
Customer Relationships
1-on-1 meetings
1-on-many meetings
Channels
Social media
Partners' channels
Conferences
Startup Weekends
Industry events
Business Support Organization Channels
Industrial and Economic Networks
Customer Segments
Individuals
Companies (small, medium, large)
Academia
Individuals
Companies (all sizes)
Academia


23/5/2017
DIH - Canvanizer
CANVANIZER 2.0 PREVIEW
Key Partners
1. Who are your key partners?
2. Who are your key suppliers?
Associazione Cluster Marche
con particolare ma non esclusivo riferimento a Marche Manufacturing, partner nell'ambito del progetto I4MS, membro del Cluster Nazionale Fabbrica Intelligente
Centri di Trasferimento Tecnologico (Meccano, Cosmob)
Imprese del terziario innovativo
in modo particolare il settore della consulenza-formazione e dell'ICT
Incubatori ed acceleratori
Key Activities
1. What are your key activities?
costituzione di una banca-dati
referenziata dei potenziali provider (di prodotti, servizi, infrastrutture, competenze, ecc.) e realizzazione della piattaforma digitale di supporto
attività di prospezione e di scouting sul territorio
progettazione ed erogazione dei servizi
forniti direttamente dal DIH
definizione di opportune modalità per lo svolgimento della funzione di orientamento e brokeraggio
verso provider esterni e per la valutazione dei risultati conseguiti
Value Proposition
1. What are your value propositions?
Accessibilità
possibilità di interazione con referenti territoriali per un primo approccio ed un primo orientamento, disponibilità di piattaforma web per accesso a materiali, report, banche-dati, ecc.
Usabilità
approccio graduale e modulare alla trasformazione digitale ed alle opportunità che essa rappresenta (value ladder da attività basiche quali animazione, informazione, alfabetizzazione a quelle a maggiore complessità e valore aggiunto, quali
Customer Relationships
1. Your customer relationships?
proattività e prospezione
per stimolare i segmenti con minore propensione alla trasformazione digitale ed esplicitarne i rispettivi fabbisogni
networking
verso le varie categorie di attori per costruire e sviluppare aggregazioni o partnership intorno ad un'idea progettuale
fidelizzazione
verso i soci ed i sostenitori
Customer
1. Customer Segm
MPMI manifatturiere dei settori "tradizionali"
moda, arredo, agroalimentare, meccanica, ecc.
MPMI dei settori "emergenti"
meccatronica, energie rinnovabili, biomedicale, nuovi materiali, ecc.
Start up e spin off
Soci e sostenitori
eventuali altri soggetti collettivi, pubblici, altri settori merceologici
https://canvanizer.com/canvas/wDOlXoUSZLYna
1/4


Lienzo De Modelo De Negocios


Key Partners
LMS
STEDE
SEVIPA
Key Activities
Technical services
Training services
Consulting activities
Value Propositions
To Hub's Members
Reduced barriers to entry
Networking
Increased Visibility
To the Community
Job creation
Enhanced image increased entrepreneurialism
Business development
Increased tax revenue
To the Community
Extended activities
Enhanced public image
Costumer Relationships
Direct business assistance to clients
Expert assistance to hub's members
Strong professional relations
Costumer Segments
OEMs
SMEs
RTOs
Start-ups
Universities
Key Resources
Intellectual
LMB and HPC Services, Robotics and CPS systems, Patents, Expertise, partnerships, sharing knowledge through workshops, seminars and webinars etc.
Human
Skilled Scientists and professionals
Financial
Investment resources
Physical
Building, Furniture and offices, machinery and robots, PCs, software licenses, Server, network equipment
Channels
Promotion Events
Social events, Networking events, RIS3 events by RWG, Workshops/ Symposia
Digital Events
Social media accounts, Promotion video, Web site, Newsletters
Conventional Marketing Tools
Leaflets/brochures, Advertisements, Mail marketing
Cost Structure
Capital expenditure budget
Administrative equipment
IT equipment
Office equipment
Personnel expenses (Part time& full time)
Capital expenditure budget
Supplies/consumables
Access in scientific resources
IT infrastructure maintenance & expansion
Facilities maintenance and expansion
Marketing and Net working
Revenue Streams
Members subscription
Services revenue
EU funding
National funding
Regional funding


PROBLEM
Inefficient transportation of blood and similar products due to their characteristics (i.e. disproportionated availability, respect of cold chain, high and increasing demand), the regulation, the high costs of the delivery, the unpredictable needs, the long delivery times
EXISTING ALTERNATIVES
Passive capsules, traditional vehicles delivery, cases of use of different drones in different contexts like Zipline
SOLUTION
2 core business:
1) Intuitive platform + app for smart medical delivery trough autonomous flight of commercial drones
2) Smart capsule for the preservation and monitoring of the quality of blood during the delivery
KEY METRICS
N° of contracts/clients, n° of capsules for each client, ROI, Break-even time, degree to which the project meet the margin goals, level of customer acceptance and satisfaction, market share, R&D costs and revenues
UNIQUE VALUE PROPOSITION
(1) Innovative delivery system that shows less direct costs thank to the autonomous flights and less time of transportation + easiness of usage of the platform. (2) The smart capsule increases blood's and similar products' quality thus reducing costs of processing, improving the compliance with law
HIGH-LEVEL CONCEPT
ABzero = Enjoy for medical delivery
UNFAIR ADVANTAGE
Strong connection with ENAC and Italian donors associations, first mover in the Italian market, patent for the capsule
CHANNELS
Direct sales, fairs, mail, LinkedIn
CUSTOMER SEGMENTS
Public and private hospital structures (+ medical staff responsible for sending and receiving the delivery - users), traditional operators of the delivery, medical laboratories, and in the future actors involved in the delivery of specific (similar to blood) perishable goods
EARLY ADOPTERS
Hospitals and traditional operators sensitive to innovation in countries with favourable regulation
COST STRUCTURE
Clients acquisition costs, support, monitoring-updating and maintenance, medical staff formation, customization/adaptation of the offer, administrative costs, R&D, production/assembly of the capsule, interface (connecting vehicles and capsule), cloud, software and app optimization
REVENUE STREAMS
Set up fee
Option 1: Annual license of the software (platform + app) + capsules
Option 2: Annual license of the software (platform + app) + capsules + renting of commercial drones
Selling of aggregate data to third parties?