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START-UP INNOVATIVE: EVALUATION METHODS AND SELECTION CRITERIA FOR AN INVESTOR

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Serial n. 215141

ACADEMIC YEAR 2019/2020

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Introduction

The choice of the theme for this work starts from the idea that the economic and commercial world is constantly evolving. Today any idea, which has substance and provides a good or a service, can be transformed into a business. Even better if this idea is new and innovative, thus increasing the number of innovative startups. Furthermore, the economic crisis, wages and working conditions, the exploitation of ideas and patents, could lead a young inventor to transform himself into a new entrepreneur. Choosing to work independently is an act of courage, you are increasingly vulnerable on the market when you put your face to it, but at the same time we could reach higher levels of satisfaction. Being a successful entrepreneur requires being aware so as not to suffer the situations that surround us but to face and re-elaborate problems and opportunities. Only in this way, the entrepreneur is aware of the value of his "creature" and can make wise and conscious choices. But evaluating a startup is not an easy task. Giving value to a newly born company without a history or a term of comparison on the market could lead to incorrect conclusions. Precisely for this reason, when an investor in startups (business angels, corporate incubators, venture capitalists, etc.) evaluates the nascent company, he resorts above all to his pragmatism and his sensitivity towards the idea.

In the first part of the work, we wanted to explain what the start-up phenomenon is in the modern world and we tried to understand which are the actors involved in the development process of a company during its start-up phase. We wanted to analyze what are the investment processes adopted and how a correlation is established between the figures identified. We then tried to understand what are the drivers and the main risk factors taken into consideration by the various actors who support companies in their early evolutionary stages by investing in their risk capital.

In the second chapter it is underlined how a startup represents a particular case of a company and to give it a value we cannot resort to the traditional methods of company evaluation, except by applying corrections and only in some specific cases and under certain conditions, this is because not all startups are the same. Some specific evaluation methods for startups will then be illustrated. The phases that follow one another to pass from the business idea to the business reality will be illustrated. Starting from the life cycle of companies, we will discover who are the different actors involved in the risk capital of start-ups, accelerating their development and we will understand how during the early stage financing of a company the figures identified as "decision-makers" represent important supports to bridge the so-called funding gap of start-ups.

The third and final chapter illustrates a real case of an innovative startup that intends to develop an alternative brace to gypsum, in the event of a limb fracture. In telling the story of this company, two of

the most used methods in business evaluation will be applied and all the steps that take place in reality will be illustrated if you intend to invest in an innovative startup. Useful information, drivers of choice, steps and expectations of the inventor are illustrated, up to comment on the results.

1 The Start-ups

1.1 Definition of the term Start-up

Among the many words of Anglo-Saxon origin used in our legal and economic system, especially in the corporate sphere, there is the term "Startup". According to the famous Treccani encyclopaedia, Startup is the *"initial phase of starting the activities of a new company, a newly established company or a company that has just been listed on the stock exchange. The term of Anglo-Saxon derivation means "to leave, Start the engine"*.¹

In general, a startup is a replicable, scalable, intrinsically innovative and temporary enterprise. In economics, there is no univocal meaning of the term startup. The following are the most popular definitions:

- Definition Of Startup By Steve Blank: a temporary organization in search of a replicable and scalable business model
- Definition Of Startup By Eric Ries: a startup is a human institution designed to offer new products or services in conditions of extreme uncertainty
- Startup Definition By Paul Graham: A startup is a company designed to grow quickly

According to Graham, but Blank is also not far from his thinking, the difference between Google and a hairdresser lies in the "time" aspect: a hairdresser does not aim to climb the market, Google does. In order to really grow a lot and in a short time, you need to know how to propose something that the market wants and that is requested by a very large number of people. And, fundamentally, you need to be able to reach all these people and meet their demands. (Paul Graham, 2015)².

A little more romantic is Malfatto's definition: *"They call them start-ups, but they are companies and so they want to be recognized. Start-up is a phase in the life of a company, that launch period, the initial moment, in which the fire is lit and wood is continued to be added to make the flame grow. In reality they are entrepreneurial creatures and ideas that have become concrete projects"* (Malfatto, 2014)³.

However, since the Startup has been the object of the attention of the national legislator, it will be the definition provided by the same that prevails, in particular, that of innovative Startup.

Pursuant to art. 25 of the Decree-Law 18 October 2012, n. 179 Joint-stock companies, also set up in a cooperative form, whose shares or portions of the share capital are not listed on a regulated market or on a

¹ [http://www.treccani.it/enciclopedia/startup_\(Dizionario-di-Economia-e-Finanza\)](http://www.treccani.it/enciclopedia/startup_(Dizionario-di-Economia-e-Finanza)) - (Italian encyclopedia)

² www.paulgraham.com

³ J. Malfatto, *Viaggio nella nuova imprenditoria. Startup e innovazione in Italia*, Historica Edizioni, 2014

multilateral trading system, and which meet the following requirements can be considered innovative Startups:

- are newly established or in any case established for no more than 5 years (in any case not before 18 December 2012);
- have their head office in Italy, in another member country of the European Union or in states adhering to the agreement on the European Economic Area, as long as they have a production site or a branch in Italy;
- starting from the second year of activity, the total annual production value, as resulting from the last approved budget within six months of the end of the financial year, must not exceed 5 million euros;
- do not distribute and have not distributed profits;
- have, as their exclusive or prevailing corporate purpose, the development, production and marketing of innovative products or services with high technological value;
- they were not constituted by a merger, company demerger or following the sale of a company or company branch;

in addition, the company must be in possession of at least one of the following three criteria:

- a share equal to 15% of the higher value between turnover and annual costs attributable to research and development activities;
- an overall workforce made up of at least 1/3 of PhD students, PhDs or researchers, or at least 2/3 of partners or collaborators in any capacity with a master's degree;
- be the owner, custodian or licensee of a registered patent (industrial property) or the owner of an original registered computer program.

As you can easily ascertain, setting up an innovative Startup requires a series of requirements and characteristics that not all companies can have, this by virtue of the advantageous treatment reserved for innovative Startups with the aim of promoting sustainable growth, technological development and employment. , especially for young people, the aggregation of an ecosystem animated by a new entrepreneurial culture devoted to innovation, the strengthening of links between universities and businesses as well as a stronger ability to attract foreign talent and capital.

The advantages of setting up an innovative Startup are:

- Zero set up costs: the company can be set up free of charge with a digital signature;
- Exemption from the payment of chamber and stamp duty;
- Particularly flexible corporate regulations: for example, an innovative Startup set up in the form of an Srl may provide for the presence of shares with or without particular rights (such as a

voting right assigned in proportion to the participation or totally absent); the possibility of carrying out operations on one's own shares; the possibility of issuing participatory financial instruments; the offer to the public of share capital.

- Facilitating the settlement of losses;
- Startups and innovative SMEs are not required to carry out the operability test;
- Easier VAT compensation;
- Facilitated employment regulations: the innovative Startup, notwithstanding the current legislation, can hire staff with fixed-term contracts for a maximum of 48 months, instead of 36. Furthermore, unlike what happens for other companies, the innovative Startups with more than 5 employees are not required to stipulate a number of fixed-term contracts calculated in relation to the number of active permanent contracts;
- Dynamic salaries: innovative Startups can agree with the staff, subject to a minimum table, which part of the remuneration is fixed and which variable. The latter may consist of treatments related to the efficiency or profitability of the company, the productivity of the worker or the working group.
- Ability to pay employees through share capital participation (eg Stock options) and suppliers through work for equity schemes
- Tax incentives for those who invest in innovative Startups
- Equity crowdfunding: innovative Startups can launch capital raising campaigns through specific online portals authorized by Consob;
- Facilitated access to the SME guarantee fund
- Facilitated and favored access to interest-free loans for business development projects
- Not subject to bankruptcy laws: innovative startups enjoy a particular regulatory regime that allows them to face the liquidation procedure more easily and quickly

Generally, loans from "specialized" investors such as business angels or venture capitalists support the company in the startup phase. According to the model similar to Steve Blank, namely the "Californian" one, a start-up can grow rapidly and "climb" only if it can immediately obtain large capital from these "specialized" investors who agree to participate in business risk in exchange for shares of the same. Since these are investors who need to see the invested capital remunerated, the natural goal of investment in startups is exit, ie the sale of the start-up to a larger company or listing on the stock exchange.

1.2 Business and financial characteristics

To really define a startup, there are 4 fundamental characteristics: scalability, replicable business model, intrinsic innovation (process or product) and temporariness. Let's try to define it below:

- **Replicable Business:** this means that a startup's business model can be repeated in different geographical areas and in different time periods without requiring major changes. On this aspect, the question to ask might be: does the business model that I am structuring allow me to have a continuity of application independent of the context, market conditions and fashion volatility?
- **Model Scalability:** the ability of a startup to grow exponentially using few resources. The question to ask is: does the business model I am structuring allow me to expand, without encountering limits related to scarcity of resources? Am I able to go from 1 customer to 1,000,000 customers in a few days? Can I reach millions and millions of people very quickly?
- **Intrinsic Innovation:** it is a "*conditio sine qua non*" when it comes to startups. Startups are born to satisfy a need not yet satisfied (or to create a need not yet evident). They are born to overturn the "status quo". They are born to disrupt (disrupt) or to create a market. They are born to innovate. The following question must be asked: do I have an innovation that brings a substantial advantage (10x or more) compared to what currently exists?
- **Temporary:** The definition of "startup" is temporary. The "startup" phase is in fact transitory and represents the first phase of the company's growth path that will lead it (hopefully) to become a large company.

From the entrepreneurial point of view, for a company in the start-up phase, without a history, the figure of the entrepreneur becomes the pivot of every evaluation of the investment project as it can be argued that for an investor the only certainty lies precisely in the personal history of the entrepreneur.

The founder of the start-up is the entrepreneur, whose concept is introduced into private rights by art. 2082 of the Italian Civil Code, which states that: "an entrepreneur is a person who professionally carries out an organized economic activity for the purpose of producing or exchanging goods or services". The 3 elements that characterize the status of entrepreneur are therefore:

- The exercise of a business activity
- The professional exercise of it
- The organization of the same

In economics, the entrepreneur is the "true activator of the economic system" (M. Talani, 2014)⁴: "The entrepreneur plays an intermediary function between those who, on the one hand, offer capital or ask for work and those, on the other, require goods and services. He transforms or combines the factors of production, that is, capital and labor, into a product suitable for satisfying the needs of consumers, and

⁴ M. Talani, La nozione di imprenditore nel codice civile, Key Editore, 2014

therefore of the market in general, and therefore presents himself as the one who performs a creative function of wealth "(A. Galgano, 1992)⁵.

To create wealth, the entrepreneur puts the invested capital at risk, be it own capital or third party capital, in order to be able to obtain an adequate compensation for this, called profit. (G. Bonfante, G. Cottino, 2001)⁶.

It is the presence of this risk that justifies the entrepreneur's power to:

- direct production and decide its economic policy (what, where and how much to produce)
- determine the structural basis of the company and the direction of its business
- choose its collaborators which it uses for the performance of its tasks

In the start-up phases, these first steps of the person who faces entrepreneurship of a scalable and replicable type are then taken and the risk attitude that distinguishes the entrepreneur must be interpreted as his ability to be able to influence positively and at his own favor events and happenings. It can be said that the success of a company largely depends on the skills of the entrepreneur and the management that follows him. The entrepreneur must be able to devise a winning competitive formula and adapt it to the new market and technology conditions having as main objective both the lasting growth of the value of the company and short-term profitability. The new business will win from the startup phase if it has three aspects:

- product / service innovation
- ability of the entrepreneur
- competitive strategy

From a financial point of view, new companies are characterized by the achievement of negative economic results due to the failure to reach the sales volumes necessary to cover the company fixed costs. This occurs because the company has not yet acquired its target market or 16 because the use functions of its products are still largely unknown or unexplored. The company's goal is to reach break-even in the shortest possible time to ensure survival in the business.

The financial need in the start-up phase arises for the following reasons:

- investments aimed at the conception and development of the project, concerns research and development, marketing studies, personnel selection and other activities of an intangible nature
- investments aimed at preparing production capacity (plants, machinery, equipment etc.)

⁵ A. Galgano con R. Comai, *L'imprenditore italiano e la delega*, AICOD, Milano, 1992

⁶ G. Bonfante, G. Cottino, *Treaty of commercial law - Vol. I, The entrepreneur*, 2001

- investments in working capital (inventories, credit granted to customers net of debts contracted with suppliers)

In an evolutionary perspective of financial requirements, the periodic cash flow worsens until the moment when sales begin, and then takes on a positive sign. The cumulative cash flow, equal to the sum of the periodic cash flows, is negative, even after the company has exceeded break-even. Total recovery of the investment may take a long time depending on the growth rate of turnover, its profitability and the duration of the working life cycle.

There is no optimal financial structure for the new company, the mix between debt and equity must be dosed in relation to the strategic profile of the company, or the objective financial structure must be consistent with the degree of risk that the company has to suffer as a result of the chosen strategy (G. Donna, 1996)⁷.

In the start-up phase of a business, it is important to maintain a high degree of financial elasticity, creating credit balances in the event that any deviations from what is foreseen in the financial plans occur. The presence of own capital is not only an obligatory choice also to show confidence in one's business externally, but it is also a choice resulting from the difficulty of accessing bank financing, caused mainly by an insufficient presence of guarantees, poor liquidity, so as well as the existence of a significant information asymmetry between investors and entrepreneurs (A. Cosh, D. Cumming, A. Hughes, 2009)⁸. Recourse to debt, while on the one hand contributes to the immediate development of a company, on the other hand limits its future one, since as the leverage ratio increases, future self-financing cannot be used to support development as it will be absorbed by the service of the previous debt.

1.3 Steps of the evolutionary process

The business idea represents the starting point of every new entrepreneurial activity (L. Peters, M. Rice, M. Sundararajan, 2004)⁹, the spark for a new start. Creative ideas and originality alone certainly do not ensure appreciable financial results (Olson, Bosserman, 1984)¹⁰. A good idea is therefore the core of the start-up while its distinctive feature is the ability to identify an unmet need and to propose a working solution (D. Prandina, 2001)¹¹. The business idea is therefore the prerequisite for the fundamental strategic choices that will describe the business project.

⁷ G. Donna, *Uno strumento al servizio della competitività*, ne L'impresa 7/1996

⁸ A. Cosh, D. Cumming, A. Hughes, *Outside Entrepreneurial Capital*, in The economic journal, 2000

⁹ L. Peters, M. Rice, M. Sundararajan, *The role of incubators in the entrepreneurial process*, in Journal of Technology Transfer, 2004

¹⁰ Olson, P.D. & Bosserman, D.A., *Attributes of the entrepreneurial type*. Business Horizons, 3, pp. 53-56, 1984

¹¹ D. Prandina, *Start up. Il manuale di riferimento per iniziare un nuovo business*, in Il Sole 24 Ore, 1 ottobre 2001

Table 1: Stages of the enterprise life cycle

Stages of the enterprise life cycle	Initial stage		Development	Expansion
	Seed financing	Startup financing		
Characterizing elements	Product processing	Establishment of the company	Start of production	Establishment and expansion of sales channels
	Analysis and evaluation of the idea	Establishment of the company	Market introduction	
	Business plan	Industrialization	Affirmation of products	
	Market analysis	Detailed Marketing Plan		
Recurring problems	Difficulty in evaluating the idea	Search for suitable management	Personal research	Competition and the difficulty of establishing one's own image on the market

Source: R. Del Giudice, A. Gervasoni, "Finanziarsi con il venture capital", ETAS 2002

Let us indicate, as suggested by Robert Goldberg, President and Founder of StartupFactory, the following stages of development of a startup:

- Early business stage: It concerns all the first phases, in which the company structure is being formed, the initial business idea is developed and begins to take concrete shape in a path that concerns: marketing, product development - service, the economic - financial plan, the legal structure and the organizational structure. At this stage we can therefore distinguish:
 - a. Seed financing: it concerns the very first moments of the development of the service product (for example with the creation of a prototype), the marketing research to be carried out to focus on the market context in which the initiative is located, the incurring of administrative costs for adopt an initial legal and managerial structure. At this stage, the marketing operations have not yet started and the main objective is to test the market, focus on the feasibility of the initial business idea, measure the interest and attractiveness for investors, verify efficiency and functionality of the team involved in the initiative.
 - b. Startup stage: At this point, the startups have usually set up an appropriate management, prepared a business plan, conducted a due diligence on the attractiveness of the product - service on the reference market. However, the sales phase of the product - service has not yet started, that is, it is in the initial stages
 - c. Early stage: In this phase, the initiative has passed the initial launch phase, but the financing needs for working capital must be focused. In this phase, the skills and competences in the different areas are consolidated: manufacturing, logistics, sales. Sales development begins to concretely take shape and size

- Second stage: At this stage it is necessary to finance the expansion of the company, which has already begun to produce and sell. At this stage, tools are funded to increase the company's capabilities in the various areas: engineering, advertising, sales network, technological platforms, plants and machinery. However, the business is carried out, in most cases, still at a loss and the loans are also used to cover working capital needs. At this stage, any future economic and financial plans begin to rest on less volatile bases
- Third stage. At this stage the company is profitable or very close to the breakeven point and needs to finance greater expansion. In this phase, the start-up characteristics are gradually lost and one becomes a normal expanding company, with its consequent financing needs

Each phase of the startup's life is characterized by different conditions and consequently the type of evaluation we can make and the most suitable type of financing to receive varies. Generally speaking, start-ups in the mature phase (Third stage and in some cases Second stage) are mainly adopted the traditional valuation methods, typically the DCF method (Discounted cash flow) and the methods based on multiples. For start-ups operating in the Early business stage, evaluation methods specifically dedicated to the evaluation of start-ups are mainly adopted.

The method of evaluating a startup varies not only with the life stage of a startup, but also whether we intend to enter or exit the capital of the same. Assessments to exit are carried out in the advanced stages of the start-up's life, therefore third stage and more rarely second stage. The investor comes out of the riskiest initial phase and wants to monetize the gain obtained and the company has lost its startup characteristics.

Another aspect to highlight is the need for start-ups for large loans in a short time and the difficulty of turning to the normal credit market due to the strong risks inherent in the business idea behind the start-up, hence the need to contact to specialized credit operators.

1.4 Financing and public policies to support start-ups

Starting an entrepreneurial experience has very strong financial implications. During the start-up process, alongside the formulation of a solid business idea, it becomes of fundamental importance to ascertain the availability of resources, it is therefore essential the ability of the entrepreneur to know or at least quantify in advance, the initial corporate financial needs and perspective. The financing of a startup varies interlocutor and methods according to the stage of development in which it is located.

As we have seen in the previous paragraph, the life cycle of a startup depending on the financing can be divided into 5 phases:

1. Pre-seed phase: the uncertainties regarding the future development of the business idea are at their highest levels and where external financial resources are very difficult to obtain. Generally during the period of conception of the innovative idea, financial constraints are stringent and lead to the use of informal forms of financing that come from the personal resources of the entrepreneur (self-financing) or from family and friends.
2. Seed phase: it is characterized by a high uncertainty of the prospective results and by a limited financial requirement, linked to the outlay necessary for the technical-economic evaluation of the investment project.
3. Start-up phase (start-up): the Startup is submitted to the market, it requires a high financial requirement but has not yet produced revenues. The capital is needed to continue the R&D activity, develop software, build technological platforms and incur expenses to start the first marketing activities.
4. Initial expansion phase (early growth): operational risk decreases, but the financial requirement remains high especially to develop an adequate distribution network. The increase in turnover favors self-financing, but not sufficient to cover all needs.
5. Sustained growth stage: in this phase, the financial requirement is proportional to the growth in turnover. Once the critical phases of start-up and growth have been overcome, during the stability phase, companies generally tend to diversify their sources of financing, turning to more complex financial instruments, as information asymmetries are reduced and the company has gained a satisfactory reputation to operate on the financial markets.

Having identified the financial needs of each phase, the different types of lenders / investors are illustrated below. In the first mile, the riskiest one, where investment almost resembles a bet, the figures that stand out are Business Angels and Incubators, followed by Venture Capitalists in a slightly more mature business phase. (E. Gualandri, V. Venturelli, 2011)¹².

According to the definition offered by the IBAN (Italian Business Angels Network, Italian association of informal investors in venture capital), business angels, a term coined in the United States in the early twentieth century, "are former business owners, managers in business or retired , who have financial means, a good network of acquaintances, a solid management capacity and a good wealth of experience"¹³. Business angels are therefore high net worth companies that usually provide smaller amounts of funding, from € 25,000 to € 500,000, in a seed or even pre-seed stage of the start-up. The return expectation is on average 20%. Angels meet the financial needs of companies in the early stages of life, invest money in exchange for a share in the share capital, are risk-prone and participate in the same management of the company. In addition, the intervention of the business angels is appropriate to fill the skill needs, as well as

¹² E. Gualandri e V. Venturelli, *Nasce l'impresa, Business Angels: investitori a valore aggiunto*, su Confindustria Modena, 2011

¹³ IBAN, Italian Business Angels Network, *Chi sono i Business Angels?*, in <http://www.iban.it/>, 20 Ottobre 2018

the financial one, characterizing the company in the start-up phase, in order to contribute to the economic success of the project.

The startup and early growth phases are generally supported by financing from Venture Capitalists. The EVCA (European Venture Capital Association) defines the venture capitalist as "an intermediary who raises funds from a group of investors, such as banks, pension funds, insurance companies and foundations, and invests them in the equity capital of newly established companies and highly innovative "(L. Sau, p.10, 2013)¹⁴. Generally a Venture Capital is configured as a limited-time economic initiative, generally 5 or 8 years. The fund has money raised from the above sources and which must be repaid before "maturity", with the highest possible return. Being a high-risk money investment, the expected return of the Venture Capital is around 30% -35%. 70% -80% of the profit on the investment operation serves to remunerate the investors while 30% -20% will operate in order to remunerate the fund which in turn will present costs, identified in salaries, offices and other miscellaneous expenses, generally estimated at around 20% -25% of the initial capital¹⁵.

The venture capital investor in venture capital represents a temporary partner of the entrepreneur, interested in monetizing his investment and making a capital gain through the sale of the stake, once the set objectives have been achieved. The disinvestment therefore consists in the total or partial sale of the investment held by the investor. Obviously, the hypothesis that the operation is not successful and that, therefore, a real disinvestment does not occur, but a partial or total reset of the value of the investment, with consequent reduction of the share held or definitive exit from the shareholding structure, the so-called write off.

Incubators and business accelerators contribute to the development and encouragement of new business proposals. The NBIA (National Business Incubation association) states that the incubator is "an economic development tool with the aim of accelerating the growth and success of new businesses through support provided both in terms of resources and services". This incubation period usually varies from 3 months to 3 years and has the aim of developing the business idea. The incubators collaborate with the start-up in the phase prior to financing, from the period in which it has not yet brought its products to the market and from the development of the business plan, until the actual start of the activity. The difference between incubators and other investors lies in the fact that the latter do not normally enter into the merits of strategic management and limit themselves to selecting investments in which they see opportunities. In the context of incubators, on the other hand, a mentoring relationship develops (D. Clutterbuck, 2008) between the management of the structure and the founders of the start-up.

¹⁴ L. Sau, *Gli effetti del venture capital sulle gerarchie di finanziamento delle Imprese innovative*, Working paper 2013, p. 10.

¹⁵ www.borsaitaliana.it

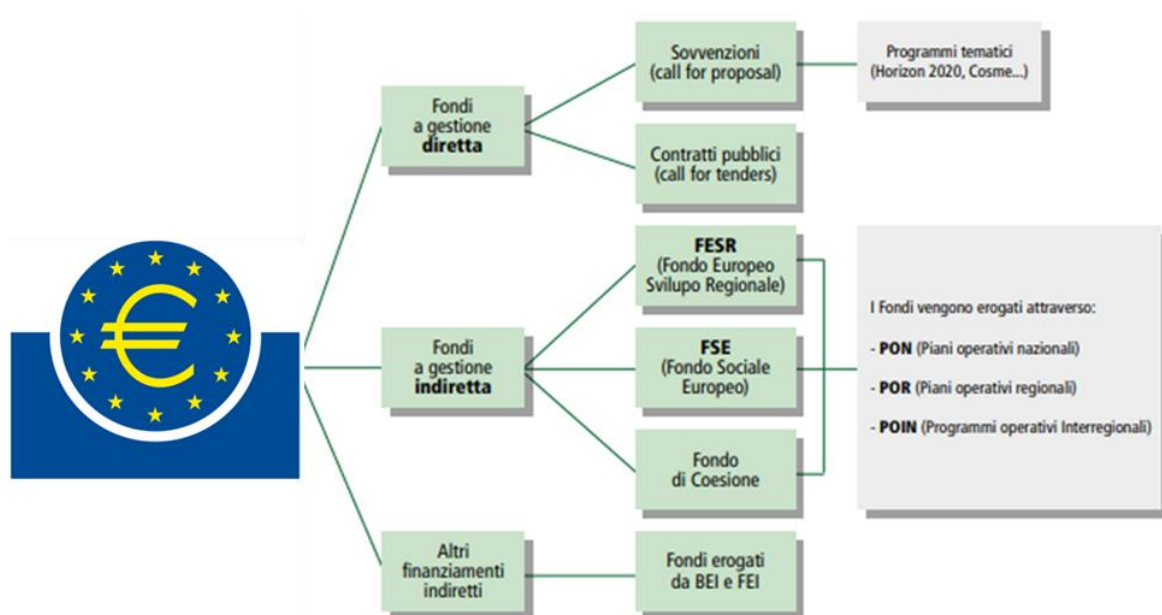
According to data reported by AIFI85 (Italian association of private equity and venture capital), the survival rate of incubator-backed start-ups reaches levels between 65% and 80% after five years of activity, thanks to support services provided by the incubator.

Public institutions also try to support the entrepreneurial fabric, launching the economy and employment, achieving growth that is smart, sustainable and inclusive.

In order to achieve these objectives, the European Union uses two types of financial instruments: direct funds and indirect funds¹⁶:

- **Direct funds:** These are contributions disbursed and managed directly by the European Commission through its Directorates General (research, education, environment, transport, etc.) which must be supplemented by the beneficiaries' own resources by way of co-financing.
- **Indirect funds:** o structural funds, are disbursed by the European Commission but managed by the National or Regional Authorities, which in turn distribute the funding through tenders. These funds, which represent the majority of Community funding, were created with the aim - in the context of European regional policy - to strengthen economic, social and territorial cohesion and to reduce the gap between the most advanced and lagging regions. development.

Figure 1: The sources of funding from the European Union



Source: Report con dati strutturali, Startup Innovative 2° trimestre 2020 – UNIONCAMERE & MSE

Untangling the many financing methods present at national level and providing a systematic framework is certainly not an easy undertaking. In fact, there can be countless ways of classifying loans: based on the

¹⁶ Bonifazzi A., Gianetti A., *Finanziare l'impresa con i fondi europei*, Ipsoa, Milano, 2014

funding body, the method of disbursement, the type of support, etc. Below is a diagram with some possible classifications which are those typically used in funding calls.

Table 2: classification of loans

Delivery mode	Tax incentive Non-repayable grant Subsidised loans
Type of activity that can be financed	Innovation Internationalization and export Startup and business start-up
Type of applicant	Startup & Innovative SMEs Company in the startup phase Entrepreneurial aspirators Enterprises with young or female members Professionals
Territorial scope	Supranational National Regional Provincial and local
Provider	European Union (direct funding) Ministries, Regions Chamber of Commerce

Source: Report con dati strutturali, Startup Innovative 2° trimestre 2020 – UNIONCAMERE & MSE

A first and immediate method of classification concerns the method of disbursement of the incentive. First of all, we can distinguish between automatic incentives and those under ban. Automatic incentives only require verification, carried out *ex ante* directly by the person who intends to take advantage of the facility, that the characteristics and methods provided for by that particular type of incentive are met. This is the case, for example, of the tax credit for research and development¹⁷.

On the other hand, the calls for tender provide for the funding body to publish a notice indicating the characteristics and methods of accessing the contribution or financing made available. A discretionary assessment is therefore required, left to the lender, both in determining the priorities worthy of facilitation, and in selecting the projects that are most effective to meet these priorities. The concessions granted may be non-repayable grants which therefore do not require the repayment by the financed party, or loans at a subsidized rate (so-called interest subsidies).

Contributions to tender aim to co-finance a project of a company, be it a startup or development: the financing body usually asks, when presenting the project, to specify the portion that will be directly

¹⁷ legge di bilancio 2017 (legge 232/2016)

financed by the company and the ways in which the resources will be found (self-financing, injection of new liquidity, etc.).

With regard to the type of activity that can be financed, particular attention at this time is reserved for the issues of innovation, internationalization and the establishment of new business activities.

In reality, what occurs is the presence of a mix of these loans and from different subjects. The entrepreneur must be able to identify the right mix of debt capital and risk capital, these will be disbursed by the various subjects based on the life phase of the company.

1.5 Role of start-ups in the Italian economy

When we talk about startups, whether you are an insider or not, we always start from the "new business / new entrepreneur" idea which sees the core of the activity in innovation, often linked to new projects and new businesses. . The attention paid by states to startups and entrepreneurship in general is justified by the ability of these entities to attract investments and contribute to the economic development of a country.

At the end of the 2nd quarter of 2020, the number of innovative startups registered in the special section of the Register of Companies pursuant to Law Decree 179/2012 amounted to 11,496, an increase of 290 units (+ 2.6%) compared to the quarter previous one (Table 3).

Table 3: Innovative startups: number and size

	1st quarter 2020	2nd quarter 2020	% Variation
N. innovative startups	11.206	11.496	2,59
N. new corporations	364.846	365.907	0,29
% innovative startups out of the total of new companies	3,07	3,14	n.d.
Total share capital declared by innovative startups	643.315.398 €	656.306.287 €	2,02
Total share capital declared by the new corporations	27.644.306.809 €	27.868.917.557 €	0,81

Source: Report con dati strutturali, Startup Innovative 2° trimestre 2020 – UNIONCAMERE & MSE

Among the approximately 366,000 joint-stock companies established in Italy in the last five years and still in an active state, 3.1% were registered as an innovative startup at the date of the survey.

The total share capital subscribed by the startups increased compared to the first quarter (+13.0 million euros, + 2.0% in percentage terms), now standing at 656.3 million euros; the average capital is equal to 57,090 euros per company, a slight decrease (-0.6%) compared to the previous quarter.

As regards the distribution by sector of activity (Table 4), 73.3% of innovative startups provide services to companies (in particular, the following specializations prevail: software production and IT consulting, 35.6%; R&D , 13.8%; information services business, 9.0%), 17.9% work in manufacturing (out of all:

machinery manufacturing, 3.2%; manufacturing of computers and electronic and optical products, 2, 8%); while 3.3% work in commerce.

Table 4: Innovative startups: distribution by economic sector

COMPARTMENT	N. innovative startups 2nd quarter 2020
Agriculture and related activities	91
Manufacturing, energy, mining activities	2.060
Buildings	103
Business	379
Tourism	68
Transport & Shipping	28
Insurance & Credit	28
Business Services	8.423
Other Sectors	284
Unclassified	32
Total	11.496

Source: Report con dati strutturali, Startup Innovative 2° trimestre 2020 – UNIONCAMERE & MSE

Looking at the composition of the corporate structures (Table 5), the innovative startups with a prevalence of women - that is, in which the ownership shares and administrative positions are held mostly by women - are 1,522, 13.2% of the total. Innovative startups with a prevalence of young people (under 35) are 2,067, 18.0% of the total. This is more than two and a half percentage points higher than that found among new non-innovative companies (15.3%). The difference is even greater if we consider the companies in which at least one young person is present in the shareholder structure: these represent 41.4% of startups (4,758 in all), against 32.8% of other companies.

Table 5: Innovative startups: distribution by company type

2nd quarter 2020	A prevalence Female	A prevalence Youth	A prevalence Foreign	With presence Female	With presence Youth	With presence foreign
Innovative startup	1.522	2.067	410	4.902	4.758	1.597
New corporations	79.517	55.943	33.206	170.443	119.916	55.081
Innovative startups / Total startups innovative	13,24%	17,98%	3,57%	42,64%	41,39%	13,89%

Source: Report con dati strutturali, Startup Innovative 2° trimestre 2020 – UNIONCAMERE & MSE

There are 410 innovative startups with a predominantly foreign shareholder structure, 3.6% of the total, a share, however, lower than that observed among other new joint-stock companies (9.1%). On the other hand, the innovative startups in which at least one non-Italian citizen is present are 13.9% (1,597), a proportion more similar to that found among joint-stock companies (15.1%).

Analyzing the geographical distribution of the phenomenon, Lombardy remains the region in which the largest number of innovative startups are located: 3,135, equal to 27.3% of the national total. Followed by Lazio, the only other region to exceed one thousand (1,302; 11.3%), and Emilia-Romagna (951, 8.3% of the national total). In a short distance, Veneto appears in fourth place, with 948 startups (8.2%), followed by Campania, by far the first region of the South, with 908 (7.9%). At the bottom are Basilicata with 121 (1.1%), Molise with 85 (0.7%) and Valle d'Aosta with 21 (0.2%) innovative startups.

In terms of employment, data for employees are not available, but only statistics relating to shareholders (Table 6). Furthermore, the data are not available for the whole sample, but only for 11357 startups out of 11496. At the end of June 2020 the shareholders of the 11.357 innovative startups for which this data is available amounted to 53.374, 643 more than in the previous quarter (+1,2%). It is conceivable that the shareholders are directly involved in the business activity. Innovative startups are characterized by significantly larger groups than other new joint-stock companies: on average each startup has 4.7 partners, compared to 2.1 found among other new companies.

Table 6: Partners number

		N. partners 2nd quarter 2020
Innovative startups	Average value	4,7
	Median value	2
	N. innovative startups with partners	11.357
	Total shareholders	53.374
Capital company	Average value	2,08
	Median value	2
	N. Capital Company with partners	350.273
	Total shareholders	727.168

Source: Report con dati strutturali, Startup Innovative 2° trimestre 2020 – UNIONCAMERE & MSE

Finally, coming to the economic and financial indicators (Tables 7), it must be premised that the financial statements data currently available, relating to 2018, cover 55.6% of the startups registered at 30 June 2020: 6,388 out of 11,496.

Table 7: Production value and active

2018		EURO
Innovative startups	Average production value	162.647,02
	Median production value	32.380,00
	Average asset value	296.011,49
	Median value of assets	79.720,00
	Number of budgets	6.388,00
Capital company	Average production value	319.034,94
	Median production value	109.803,00
	Average asset value	741.118,72
	Median value of assets	105.317,00
	Number of budgets	185.073,00

Source: Report con dati strutturali, Startup Innovative 2° trimestre 2020 – UNIONCAMERE & MSE

Among the innovative startups thus circumscribed, the average value of production per company in 2018 was just under 163,000 euros, a decrease compared to the previous quarter (over 6,000 euros less). The average assets amounted to 296 thousand euros for innovative startups, down by about 9 thousand euros compared to the previous survey. Finally, considering total production, it amounts to 1,038,989,145 euros, a figure that is 74.1 million euros lower than that recorded at the end of the previous quarter (1,113,081,123 euros).

The total operating income (Table 8) recorded in 2018 was negative by 77.8 million euros, down by 2.6 million compared to three months ago (-80.4 million).

Table 8: Main economic indicators

2018		EURO
Innovative startups	Total production value	1.038.989.145
	Total operating income	-77.795.414
	Total fixed assets / net assets (x 100)	26
Capital company	Total production value	59.044.754.290
	Total operating income	2.200.607.366
	Total fixed assets / net assets (x 100)	4

Source: Report con dati strutturali, Startup Innovative 2° trimestre 2020 – UNIONCAMERE & MSE

One of the parameters that most distinguish innovative startups compared to other new corporations is the high degree of fixed assets on net assets: in this quarter the ratio is equal to 25.6%, i.e. about 7 times higher than the average ratio recorded for the other new companies, equal to 3.8%.

In 2018, a majority of loss-making companies remained among innovative startups: over 51.8% (a figure of just four hundredths of a percentage point lower than the previous survey), against the remaining part (approximately 48.2%) which reports an operating profit. As is physiological for companies with a high

technological content, which have a longer time to access the market, the incidence of loss-making companies among innovative startups (equal to over 51.8%) is significantly higher than the detectable one. among the new non-innovative joint stock companies (just under 32.8%).

The ROI and ROE profitability indicators of the innovative startups (Table 9) recorded negative values; if, however, it refers only to those in profit, the indices are significantly better than those reported by other corporations (ROI: 0.12 against 0.06; ROE: 0.26 against 0.17).

Table 9: Main profitability indicators

2018	Innovative startups		Capital company	
	TOTAL	Net income	TOTAL	Net income
ROI	-0,05	0,12	0,02	0,06
ROE	-0,15	0,26	0,05	0,17
Financial Independence	0,32	0,32	0,45	0,45
Added value / Production value	0,24	0,36	0,26	0,28

Source: Report con dati strutturali, Startup Innovative 2° trimestre 2020 – UNIONCAMERE & MSE

2 Start-up evaluation methodologies

The evaluation of companies in the start-up phase is characterized by a certain complexity largely due to a number of factors such as: the ease of failure of the initiative, the lack of reliability of forecasts due to a lack of historicity of corporate performance, as well as the dynamics and entrepreneurial skills of the founders.

Investment in a start-up can generally take place in two ways: through the purchase of new share capital (Equity) or through a non-repayable "loan" with the possibility of converting it into Equity at a later time through a capital increase social. In both modes, the investing company will register the equity investment among financial fixed assets using the cost method¹⁸. This accounting entry will be carried out both at the time of birth and in the initial phases of the start-up in question, called Pre-Seed and Seed, and in the subsequent phases of the capital increase or those phases called Rounds (Round A, B etc.).

Regardless of whether the business is held on the basis of entrepreneurial and commercial logic or, rather, to obtain a future Capital Gain from the sale of the shareholding, during the first years of the start-up it is very complex and onerous to estimate the value recoverable of the shareholding in place.

In the event that this investment is recorded in the fixed assets of the company, the cost method envisaged by the national accounting standard OIC 2119 - Investments, must perform an analysis aimed at proving that there are no permanent losses in value²⁰. This accounting principle represents a fundamental point in the Italian economic and business disciplines. The national accounting standards, issued by the Italian Accounting Body (OIC), constitute the fundamental regulatory reference for the standard accounting practice adopted by Italian legislation for the preparation of the financial statements. They are compared with the international accounting standards (IAS/IFRS), issued by the IASB (International Accounting Standards Board), constituting the first challenge at worldwide standardization of accounting rules.

The same principle defines, in paragraph 31, that the lasting loss of value is determined by comparing the value recorded in the balance sheet with the recoverable value through the analysis of the expected future benefits. In the following paragraphs of the OIC 21 standard, further situations relating to situations internal to the company, the reference market, the failure to exercise a call option for the increase of the share capital; it is also envisaged that, when the investee is in its first year of activity or in the initial phase and incurs substantial losses, it does not necessarily have to be written down as long as conclusions can be drawn from the following year for a general recovery or maintenance of business plans²¹.

¹⁸ OIC 21, paragraph 10 - Partecipazioni

¹⁹ OIC 21, paragraph 21

²⁰ OIC 21, paragraph 27

²¹ OIC 21, paragraph 39

However, when applying the accounting standard of reference to a start-up, the chosen for the valuation is often difficult to identify. If at the time of initial recognition, the investment in a start-up in the Pre-Seed or Seed phase is recognized in the financial statements at cost, the problem of valuation and relative maintenance of the value of the same arises in the following years before Round A and in the following moments. Management must verify that the value recorded in the financial statements has not suffered a lasting loss in value. In these transitional phases, the Pre-Money valuation logic can alter the real perception of future economic benefits.

For the evaluation of the start-up, management generally has three categories available of methodologies:

- methods based on future cash flows;
- comparison with market values and related multiples;
- qualitative methods.

2.1 Direct and Indirect methods

From all the considerations made in the previous paragraphs, the uniqueness of the situation in which the start-up companies find themselves emerges; it is therefore clear that traditional valuation methods are applicable only to a limited extent and under certain conditions. They are applicable, but with the clarifications and limits that characterize the different methods, with the exception of the DCF (discounted cash flow) method and the methods that refer to multiples, which are also used for ex-ante valuations, all other methods are normally inapplicable, unless the company is in the "third stage" and therefore exits the startup phase and becomes a normal company in expansion, with its consequent financing needs.

Business valuation allows you to calculate the value of the company using and comparing the most popular methods. The two main methods of evaluation²²:

- Market multiples (direct method)
- Discounted cash flows - DCF (Indirect method)

The multiples method is based on the idea that similar assets sell at similar prices: this also implies that some financial aspects, such as operating margin or cash flow, are the same or in any case very similar.

Generally, the term "multiple" means the relationship between the market or the estimated value of an asset, placed in relation to a specific element of the balance sheet.

²² Borsa Italiana, *I principali metodi di valutazione aziendale*, FTA Online, Milano, 2011 - <https://www.borsaitaliana.it/notizie/sotto-la-lente/valutazione-aziendale-134.htm>

This valuation approach assumes that a given multiple is applicable to multiple companies operating in the same sector, so if some startups are comparable, it is possible to determine the value of one based on that of another very similar one.

The market multiples method is therefore based on the price of comparable assets (listed companies belonging to the same sector), applied to balance sheet data such as turnover, gross operating margin (ebitda), gross operating result (ebit), net profit, shareholders' equity, net financial position and cash flow. The multiples therefore represent the relationship between price (capitalization) and balance sheet data. In the case of companies with cash surplus the enterprise value (EV), equal to the sum of the capitalization (number of shares per unit price) and the net financial debt, will be lower than the capitalization while in the case of indebted companies the EV will be higher. The EV is related to the EBITDA, EBIT and revenues (sales).

The main multiples are:

Table 10: The market multiples

P/E	EV/Sales
P/Sales	EV/Ebitda
P/Cash Flow	EV/Ebit
P/PN	P/Ebitda
D/E	Ebitda/Sales

Source: Borsa Italiana 2011

Below we indicate some more details of the most used indices²³:

- P/E: is the ratio between the company's stock market capitalization and net profit. It represents the number of years in which the company would repay the investor with the profits earned. It is the most used multiple for listed companies
- P/BV (Book Value): It expresses the relationship between the company's stock market capitalization and the book equity. Method used mainly by sectors with a high capital content (Banks, insurance companies, financial companies)
- EV/Sales: is the multiple least affected by trends and by accounting policies; it tends to be relatively stable over time; is closely linked to the company's growth capacity. Widely used for start-up companies

²³ Fiori A., *Valutazione d'azienda con metodo dei multipli*, B2Corporate, 2014

- EV/Ebitda: It is one of the most frequently used multiples; it is little influenced by accounting or tax policies; more than others, it is able to express the ability of core business to generate value. Used for companies with stable or mature business
- EV/Ebit: It is used as an alternative to the previous multiple, based on EBITDA; it can create distortions when comparing realities from different countries

There is no multiple valid for all occasions, to make appropriate choices the following general indications may apply:

- choose the most significant accounting aggregate as a multiple in relation to the characteristics of the sector and of the company to be analyzed
- choose at the base of the multiple the balance sheet aggregate less subject to accounting practices and management policies that may make it less homogeneous in the sample
- choose the multiple that has greater stability over time
- choose the multiple that has the lowest variance among comparable companies.

Most start-ups, especially those that have yet to start generating revenue, base their value on future development potential. The Discounted Cash Flow (DCF) Method goes in this direction, because it tries to predict the cash flow that the company will produce in the future, taking into account the expected rate of return on the investment.

The cash flow method is based on the determination of the present value of the expected cash flows from a specific asset. The flow can be represented not only by cash flow but also by dividends (Dividend discount model - Ddm). The valuation based on discounted cash flows is a function of three fundamental elements: the amount of cash flow, the distribution of the flows over time and the discount rate:

$$V_A = \sum_{i=0}^n \frac{CF_i}{(1+r)^i}$$

$$\text{company value} = VA + NFP + \text{asset}$$

VA = Value

n = number of years for which it is possible to estimate the cash flows





r = WACC = Weighted Average Cost of Capital

NFP = net financial position

Asset = value of assets no core business

The market multiples method is the most used and the simplest, while the cash flow method is the most rational. We could summarize the advantages and disadvantages of these two methods in 4 points per model:

Table 11: Advantages and Disadvantages

MARKET MULTIPLES METHOD		CASH FLOW METHOD
Ease of use		Rational method
Quickness		Full evaluation
High degree of subjectivity		Not applicable to companies with economic difficulties
Difficulty finding similar companies for comparison		For unlisted companies, it is difficult to quantify the degree of risk

Source: own processing, Borsa Italiana data

For both valuation methods, the determination of future economic results is fundamental, ie the data to be included in the respective calculation models. The projections are derived from: basic assumptions (macroeconomics, sector trend, company trend being evaluated) business plan and industrial plans.

The assessments obtained from the application of the two methods can also differ greatly from each other. Usually experts use the (weighted) average of the two methods to calculate the final evaluation.

In addition to the DCF method, there are other indirect methods of valuation:

- *Simple equity method and complex equity method:* Its consist in the valuation of the individual components of the assets and liabilities that can be deduced from the financial statements, adjusted up or down according to any differences found between the values recorded in the financial statements and any different values applicable for the purpose of the valuation of the company, which may generate gains or losses. In the complex equity method, intangible assets not accounted for in the financial statements are added, such as: trademarks, patents, research and development costs, goodwill, concessions or licenses. The resulting value is referred to as adjusted equity. It is clear that the start-up company does not have assets that are significant for the valuation, moreover the value of the existing intangible assets is all to be verified, in light of the future developments of the proposed business initiative to which the intangible assets are linked.
- *Income method:* The income model is based on a forecast of expected income flows discounted at a rate consistent with the chosen flows, possibly with a specific estimated growth factor. To carry out the relative calculation it is necessary to normalize past income, purifying it of anomalous or extraordinary elements and making estimates on possible future income. The time horizon for the

development of income can be infinite, or for a certain period of years. Also in this case, future profitability appears too uncertain in a start-up company (moreover, no historical data is available), in order to be able to constitute a valid basis for its evaluation.

- *Complex or mixed income-patrimonial methods*: This is the complex UEC method, which combines the characteristics of the equity method and the income method, thus balancing the equity aspect with the income aspect of the company to be evaluated. The income part is based on the discounting of excess income compared to parallel investments made in the absence of risk. The above considerations apply to the equity and income methods.

2.2 Hybrid and alternative models for the evaluation of start-ups

The evaluation of start-ups, especially in the early business stage and to a lesser extent in the Second stage, follows its own and specialized rules, in fact it is a business, as has been mentioned several times²⁴:

- operate in the absence of historical data
- subject to a strong entrepreneurial risk component; the initial business idea has yet to find its concrete realization
- with average payback times that are not short
- where the figure of the evaluator and the investor often coincide, especially in the initial stages
- in which the value of the necessary investment is first determined, then the share of capital to which this investment refers
- which counts not only the technique, but also the intuition and specialist experience of the investor – evaluator

It is fair to point out that in many cases we are not in the presence of a single equity loan, but of several rounds of loans that occur temporally as the start-up continues on its path. In each of these rounds the capital is diluted, with the entry of new shareholders; normally the valuations corresponding to subsequent loans are higher than the valuations corresponding to previous loans.

It is therefore important to distinguish the evaluation before and after the proposed funding. The valuation carried out before the investment is called the *pre money valuation*, the evaluation made after the proposed investment is called *post money valuation*. Connected to the evaluation is the corporate share of the start-up that is due to the lender.

If the pre-money valuation of the next round is higher than the post-money valuation of the previous round (which is the most frequent case), the investment is called upround. Conversely the opposite will be the

²⁴ Bini M., Guatri L., *La valutazione delle aziende*, Egea editore, 2013.

downround. Of course, several months or years may have intervened between the first and second rounds and the assessment prospects may have changed completely, in this case in a favourable sense.

The difference between the pre-money valuation and the post-money valuation can also be interpreted as a risk premium, assigned to the investor if the initiative continues towards subsequent financing.

Here are some references to the main evaluation methods specific to a start-up:

- **Venture Capital Method** (Bill Sahlman, 1987)²⁵: The Venture Capital method can be used to evaluate early stage start-ups, which is why it is widely used by venture capitalists, who often invest in start-ups at this stage. The logic behind this method of valuing a company is very simple: when a venture capitalist or investor decides to participate in venture capital by taking over a stake, he expects that in the future, when he leaves the company, his shares will have acquired a share value such as to justify the investment, in order to guarantee an important economic return. The Venture Capital method takes into account 2 variables to estimate the value of a company: the expected ROI and the Exit or Terminal Value (TV), over a time horizon of about 5/8 years. By that date, the start-up should be out of its initial stages and be sold on the market like any other company. The formula to be applied is the following:

$$\text{Post Money Valuation} = \text{expected ROI/TV}$$

$$\text{Pre Money valuation} = \text{Post Money Valuation} - \text{Amount Invested}$$

TV is the amount that the investor expects to get when he leaves the investment, the ROI target is the return on the investment that the investor expects, it must be high, considering the high risk of the investment same.

- **Scorecard method**: was developed by the business angel Bill Payn is based on an initial comparison of the average of the pre-money valuations of other start-ups active in the same sector and in the same geographical area and of some specific variables, such as characteristics of the management team, type of product and of the technology used, size and competitiveness of the market in which it operates, need for further investments, partnerships and sales channels etc.

This method can be used under the following conditions:

- There must be a broad reference market from which it is possible to derive average data of start-up evaluations by geographical area, product sector, etc.
- We are able to assign evaluation parameters and to the various components of the start-up.

²⁵ Sahlman, William, Scherlis D. R., *A Method For Valuing High-Risk, Long-Term Investments: The "Venture Capital Method"*. Harvard Business School Background Note 288-006, July 1987, (Revised October 2009).

- **Berkus Method²⁶**: widely used in the early stage, takes its name from its creator. It is based on the attribution of a score to 5 key success factors of the company and, depending on the size of the reference market, a value is attributed to these, the so-called pre-valuation money (normally € 0 to € 500,000). The reference factors are:

- Managerial Qualities of the Team (Execution Risk)
- Value Proposition (Product Risk)
- Working Prototype (Technological Risk)
- Strategic relationships (Market risk and competitive risk)
- Product already launched and / or sold (Financial or production risk)

The value obtained must be related to the investment required (ei for the implementation of the product / process) to ultimately determine the percentage of capital to be attributed to potential lenders.

$$\% \text{ Capital} = \frac{\text{required Investment}}{\text{pre - valuation money}}$$

The evaluation clearly contains a good dose of subjectivity and the logic of this method is: the cash flow projections in early stage start-ups are highly uncertain, with a very high percentage of not being able to reach the set value.

- **First Chicago method²⁷**: Since start-ups are high risk of failure companies, due to their very nature, the First Chicago method is very useful for taking into account different scenarios, since it is far from simple to predict the future of a start-up. In this valuation method the various hypothetical scenarios are combined with each other to obtain an evaluation of the start-up that derives from an average. This type of method is widely used in early stage, because it allows to obtain better results.

The First Chicago Method refers to several scenarios:

- "best-case scenario" (most optimistic scenario)
- "base case" (intermediate scenario)
- "worst-case scenario" (worst-case scenario)

To define each scenario, the evaluation proceeds by following three steps:

1. Each of the three evaluations is carried out using the DCF method, if not applicable multiples are used
2. At each of the three evaluations. A percentage of probability is assigned
3. The final evaluation is given by the values weighted with probability

²⁶ Berkus D., *The Berkus Method – Valuing the Early Stage Investment*, Berkonomics press, 2009

²⁷ Catty J.P., *The First Chicago Method*, Corporate Valuation Ltd, 2008

- **Real Options:** With these methods, in addition to the equity components and expected cash flows, the strategy pursued and the ability of management to dynamically manage the development of the business and its strategic choices are also assessed. The discretion of management in governing the company has in fact a value that must be kept in mind. Considering that the choices offered to management can be assimilated to financial options of the call or put type, theorists have developed the theory of real options. In particular, the theory of real options aims to evaluate an investment project, and similarly a company, in the light of future opportunities related to specific strategic choices. However, this method presents difficulties linked to calculation problems and the difficulty of concrete elaborations. With this method, the value of a company is conceived as a sort of right to collect future cash flows, when and if they will come true. The value of the company is shown as a portfolio of call options to buy. In particular, real options present a wider range of financial options and among the strategic choices available to management we can find:
 - growth options aimed at the dimensional development of the business
 - flexibility options aimed at increasing the company's ability to respond to market changes (e.g. through the outsourcing of production)
 - deferral options to postpone a project when there are future expectations of better returns or abandonment in the event that the liquidation value of a project is higher than that of the expected cash flows.

The overall value of a company therefore derives from the sum of the value of the cash flows that the current strategy can generate and the value implicit in the future strategic options that management can implement.

The Monte Carlo method is often used for the application of the real options methodology. This method is commonly used to derive estimates through simulations. It is based on an algorithm that generates a series of linked numbers, which follow the probability distribution. The Monte Carlo simulation is well executed if the average value and the variance of these measurements on the system realizations converge to the true value.

2.3 Characteristics of start-up evaluations

For start-up companies, given the physiology of negative results in the first years of management, it is essential to estimate how many years these losses will have to be incurred, a fundamental element is to estimate the maximum period within which the company will become cash-positive in order to avoid liquidity crises (through a break-even-point analysis). In the early stages of life, the company still does not express its potential, it must therefore necessarily defend itself from the possible assault of investors who could take advantage of the start-up's need for liquidity to have a very high future economic return.

Knowing your own value, quantifying your idea therefore allows you to reach a level of awareness that allows you to make decisions with greater knowledge of the facts and to optimize and maximize business utility.

There are therefore elements that play a fundamental role in the evaluation of a start-up. Between these:

1. **Time:** The start-up, in the course of its evolution, needs to acquire fundamental financial resources to continue its growth and the achievement of the set targets. Time is a fundamental indicator for parameterizing the level of funding received. In this perspective, the analysis of the investments received over time represents the key to understanding the phenomenon and in particular to predict the possible future of a start-up.

Table 12: Stage & Investors

Stage	Financing (Mio €)	Investor
Seed	< 0.5	Business Angels
Start-up	1	Business Angels
		Venture Capitalist
First Stage	1 – 3	Venture Capitalist
Second Stage	3 – 5	Venture Capitalist
Third Stage	5 – 10+	Venture Capitalist
		Financial intermediaries
Bridge Loans	10+	Financial intermediaries

Source: own processing - data KPMG

Time is also related to the level of risk and the return on the cost of capital required by investors depending on the stage the company is in:

Table 13: Stage & IRR

Stage	IRR
Start-up	40 – 60 %
First Stage	30 – 50 %
Second Stage	25 – 35 %

Source: own processing - data KPMG

We can conclude that the investments received by a start-up are positively correlated with the time of existence of the same for the quality of the activities carried out by the company.

2. **The idea and the underlying need:** what we should observe when evaluating the idea of a start-up is the size of the potential market of consumers interested in the innovative proposal of the start-up, we should understand if it is an innovative way of carrying out an activity or in the creation of a new product or in a different approach to the market than the status quo²⁸. We refer to a pre-existing market and / or to a potential one that could open²⁹. Therefore, the value of a start-up also depends on the profile of the "need to be satisfied", that is, on an estimate of the potential users of the start-up potentially attracted by the service / product offered and on the impact it manages to have on the national economic fabric. and international. To respond to this, during the conception phase, it is useful to carry out market research that confirms or does not confirm this interest and impact. We can conclude that the greater the number of potential users that the service or product of the start-up is able to conquer, the greater the interest that investors attach to the start-up.
3. **Human capital:** The creation and development of a start-up, in its first moments of life, is mainly connected to the work that is carried out by its founders. In particular, it can be said that it is necessary to create a balanced team, that is, heterogeneous in its composition³⁰. A further feature is the knowledge that the founders have of the market in which they are located and how this evolves. It has also been found that it is easier to attract investors when the founders of the start-up have already had experience in setting up other successful start-ups³¹. Therefore, if the characteristics of the team of the founders of a start-up are of high quality, i.e. they have a broad academic and working background in the sector in which it operates and in start-ups in general, a

²⁸ E. Kleinschmidt, R. Cooper, *The impact of product innovativeness on performance*, in Journal of Product Innovation, 1991

²⁹ C. Bussolati, F. Malerba, S. Torrìsi, *L'evoluzione del sistema industriale italiano e l'alta tecnologia*, C. Bussolati, F. Malerba, S. Torrìsi, L'evoluzione del sistema industriale italiano e l'alta tecnologia, 1995

³⁰ I. Vanaelst, *Entrepreneurial team development in academic spinouts: An examination of team heterogeneity*. Entrepreneurship Theory and Practice, 2006

³¹ B. Clarysse, N. Moray, *A process study of entrepreneurial team formation: the case of a research-based spin-off*, in Journal of Business Venturing 19(1):55-79, January 2004

good heterogeneity and a constant commitment to development of the company, investors' interest in the start-up grows.

4. **Business Model (BM):** for a start-up it is essential to be able to obtain the consent of the lenders, it is therefore essential that the business plan makes its task in showing the economic-financial analysis clearly. The business model of a company allows us to know its peculiar characteristics, its purpose and the type of strategy it intends to undertake to pursue it, having the opportunity to evaluate whether it is a strategy that can work or if there is a risk that is bankruptcy. The BM represents the logic according to which the founders and therefore the start-up, want to create, distribute and collect value. It reflects the growth potential that the company presents. Scalability is a factor sought by every type of investor in projects that can be financed and financed. In the absence of this parameter, within its reference time horizon, the investor will most likely refuse to invest in this project³².
5. **Sector:** Investors' interest in a start-up increases if the market in which it operates is as broad as possible, shows a growth-oriented trend and allows easy contact with the end customer (A. Maxwell, J. Scott, M. Lévesque, 2011). Other aspects to consider are: the degree of competitiveness, concentration and importance of the start-up's competitors. In fact, there is a positive relationship between the lack of competition in a sector, i.e. the lack of a very powerful competitor recognized as such by end customers on the market or the absence of many competitors on the one hand and the possibility of receiving greater interest from investors on the other³³.
6. **Network:** In a start-up phase, it becomes essential to have the opportunity to get in touch with professionals with a mentor function for the same, who are able to improve their value proposition and business model, to increase their reputation, visibility and image thus amplifying contact with a greater number of investors and end customers³⁴. The possibility of creating a network to support a start-up is not connected only by the possibility of using the support services but also by the previous experience of the founders of the start-up³⁵. The role of incubators, business angels and venture capitalists is not comparable to an investment by an exclusively financial investor, as they allow their start-ups to develop a wide network, allowing them to create greater value thanks to the network. of contacts made available to them³⁶.
7. **The Communication:** the subjects with which the start-up must communicate are of different types and vary from customers to different types of investors. The relationship that is developed with

³² A. Maxwell, J. Scott, M. Lévesque, *Business angel early-stage decision making*, in *Journal of Business Venturing*, 2011

³³ A. Maxwell, J. Scott, M. Lévesque, *Business angel early stage decision making*, in *Journal of Business Venturing*, 2011

³⁴ C. Boschetti, A. Grandi, R. Grimaldi, *Risorse, competenze e incubatori di impresa*, 2011

³⁵ D. Shepherd, R. Ettenson, A. Crouch, *New venture strategy and profitability: a venture capitalist's assessment*, Volume 15, Issues 5–6, September–November 2000, Pages 449-467

³⁶ F. Lazzeri, *Il ruolo degli incubatori d'impresa*, in *Centro Studi e Ricerche Tocqueville-Acton, Quaderno di Teoria n. 16 – maggio 2010*

end customers can be conveyed on tools such as the institutional website of the start-up and social media, through which it is also possible to obtain an update on the evolution of the start-up as well as on the characteristics of the service / product offered, thus also developing a type of communication defined as “intangible”³⁷. The tools usually used by startupper to interact with investors, in the initial phase of the relationship, are pitches, that is short presentations characterized by an extreme synthesis and "captivating" aspect compared to the peculiarities characterizing the investor himself. A pitch is essential to create a first contact with investors, and for the latter it aims to understand if “the game is worth the candle”³⁸. At the same time, it is advisable not to provide excessive information, as it could reduce the initial understanding of the project and drive the investor away³⁹.

2.4 Protect intangible assets and intellectual property

In its development phase, the company creates intangible assets such as the brand or the process used to provide an innovative service or to sell products. The protection of these activities is aimed at avoiding their use by imitators.

Intellectual property rights confer the legal safeguards necessary to prevent third parties from stealing the company's intangible assets. This is a fundamental element of the perimeter of value of any company, which involves both the need to adequately protect this right, and the need to ensure that it does not violate the rights of others.

The type of intellectual property rights varies according to the type of resources to be protected⁴⁰:

- *copyright*: to protect works, software and databases
- *registered trademarks*: to protect the name of the company, products and services
- *domain name registration*: to protect the company's internet address
- *trade secrets and know-how*: to protect confidential information
- *patents*: to protect the company's inventions or improvements to a product
- *ornamental model*: to protect designs and models.

A patent can protect an invention by excluding anyone else from its benefits can arise: no one can use the same process or sell the same product without the your agreement. Before marketing products that incorporate new technical solutions is highly recommendable make a “*freedom to operate*”. A patent may be sufficient to discourage the use of your invention by others to them benefit, but it is also necessary to be

³⁷ B.Lev, Sharpening the intangibles edge, in Magazine of Harvard Business Review, June 2004

³⁸ A. Chwolka, M. Raith. *The value of business planning before startup - A decision theoretical perspective*, Journal of Business Venturing, Elsevier, vol. 27(3), pages 385-399, 2012

³⁹ A. Zacharakis, D. Meyer, *A lack of insight: do venture capitalists really understand their own decision process?*, in Journal of Business Venturing, vol. 13/2018, issue 1, 57-76

⁴⁰ KPMG Advisory, *Startup: istruzioni per l'uso*, KPMG S.p.A., 2018, p. 94 ss.

aware of the costs associated with the exercise of this protection. This is a patent search aimed at identifying any patent rights that may hinder the marketing of a product in a given area geographic.

A patent must have the following characteristics, to be valid:

- *New*: must never have been produced or registered anywhere in the world
- *Inventive*: an invention to be patentable must be non-trivial and represent a step in ahead of the current state of the art
- *Lawful*: cannot be contrary to public order or morality
- *Industriality*: only solutions that can be reproduced on an industrial level can be patented.

There are two types of patents:

- *patent for invention*: the strongest form of protection granted to those inventions which have a high degree of innovation and which represent a new and original solution ad a technical problem never solved before. The patent for an invention has a duration of 20 years and is not renewable
- *utility model*: represents an improvement modification of existing objects. It lasts 10 years and is not renewable.

An Italian patent protects the invention only in Italy. To extend patent coverage, it is necessary to use European and international registration and patenting systems.

To obtain the registration of a patent it is necessary to consider the initial costs for submitting the application. Obtaining a patent is a long and expensive process. It is often convenient to protect an invention in the form of a trade secret, also because it is necessary to report the details of the invention in the patent register is equivalent to making them public.

When we are faced with an innovative start-up, especially in its initial phase, the value of this often coincides or almost entirely overlaps the value of the invention it holds and intends to exploit. The economic evaluation of patents is based on an interdisciplinary approach that jointly considers the legal, accounting, fiscal, industrial, commercial and strategic aspects.

In particular, first of all must be considered:

- *technological*: utility and industriality of the invention; capacity to create standards
- *legal*: analysis of the intensity of the degree of protection offered by the granting of the patent in the various cases
- *accounting*: evaluation of the patent and of the research and development expenses that support it
- *tax*: impact of taxation in the event of patent transfer, taxation of royalties
- *strategic-productive*: differential surplus value of the patent, ability of the patent to allow the realization of economies of scale and/or experience

- *micro and macro-economic*: monopoly income deriving from the ownership and the right of exploitation of the patent, detectable at the level of a single company but extendable with a network effect, in an aggregate perspective, even to a chain of companies or to an industrial district

As we have said, in the initial phase of a company's life, its value often coincides with that of the invention it intends to exploit.

The main methods for estimating the market value of patents can be traced back to the same visas to evaluate a startup in its entirety, they can be traced back to two types: empirical methods and analytical methods⁴¹. The empirical methods are based on the practical observation of market prices of intangible assets sufficiently similar and, as such, comparable⁴². Analytical methods, on the other hand, have a more solid scientific foundation and a greater tradition even in the professional field and are based above all on an income-financial approach, to estimate how much an asset (a patent) is worth today on the basis of expected future returns or an estimate of costs incurred or reproduction/replacement.

The most used methods are based on the actualization of alleged royalties, which means quantifying "how much would it cost the company to license a non-proprietary patent?" or on the income and incremental cash flows, made possible by the exploitation of the patent, or on the costs of reproducing the same or on other methods, also based on stock market prices, where available. Among the applications of the assessment, first of all, the difficult quantification of the infringement damage is highlighted.

The choice of the methods to be used depends on the type of patent and the purposes and context of the assessment, but also on the ease with which reliable and significant information can be found on the patent and on the market in which it is positioned.

Some of the patent evaluation methods are defined below:

- **The presumed royalties method:** An easily applicable empirical method is based on the determination of the "presumed royalties" that the owner of a patent would have requested to authorize third parties to exploit it (also known as the "consent price" method).

The presumable market value of a patent can be estimated as the discounted sum of the presumed royalties (which the company would pay as a licensee if the patent were not owned) discounted, over a time horizon of at least 5-7 years and in any case not exceeding its maturity.

In the evaluation of a company that owns patents, the presence of license agreements is particularly appreciated by investors, also because it generates typically non-occasional revenues

⁴¹ L. Guatri, M. Bini, *Nuovo trattato sulla valutazione delle aziende*, 2005, Milano; J. Hand, B. Lev, *Intangible Assets: Values, Measures, and Risks*, in Oxford University Press eds 2003

⁴² These methods, widely used in the valuation of companies, especially if listed, are in theory inapplicable to patents, which have characteristics of uniqueness and originality that prevent any comparison at the root. Despite these difficulties, comparisons are sometimes possible (think of two different drugs that treat the same pathology) and from them derive economic considerations worthy of relevance

and constitutes a signal to the outside world of the company's technological assets and innovative capacity⁴³.

- **The incremental income method:** the value of a patent is the greater the more the associated expected operating economic results are high to the patent itself. Therefore, where a going concern is considered, the contribution of an intangible asset in terms of positive price and / or volume differentials (and therefore, economic margin) to business profitability can be measured using the differential income method, which determines the value of the patent to an extent equal to the value current of the sum of the above defined differential income that the patent will presumably produce in the future. The number of years of the actualization of the income deriving from the exploitation of the patent depends on his life cycle (useful life).
- **The estimate of the cost incurred (or of reproduction):** in the absence of available data on earning capacity, a possible alternative is that of the cost incurred to create the patent and to occupy the market positions reached by the same at the valuation date. It is a question of identifying the most significant costs incurred, also considering their percentage with respect to sales:
 - research and development costs;
 - charges relating to the filing and granting of the patent (legal advice, application fees, publication fees, concession, etc.);

However, this procedure has limitations compared to the differential income method. A limit derives from the known unsuitability, due to the change in the purchasing power of the currency and to the variation of economic conditions, historical costs to measure values at a later time. The second limit is due to the fact that the value of an asset is not due only to the costs necessary to obtain it, but also and mainly to the future benefits that can be derived from it.

- **Tobin's Q and Price / Book Value ratio:** the stratification of differential income thanks to the patent generates an incremental asset, which expresses the difference between the market value and the book value of the company; this is a suitable element to express - in a somewhat coarse but often effective way - the surplus value of intangible assets that rarely find "satisfaction" in their book value and which have led the doctrine to speak of a "ghost" differential⁴⁴. The incremental assets can be estimated through the well-known Q index created by Nobel laureate J. Tobin, equal to the ratio between the market value of the company and the replacement cost of tangible assets; if $Q > 1$, the company is worth more than its tangible assets and this surplus value expresses the value of the intangible assets. In a complementary way, the relationship between price and book value can be used, which expresses the comparison between market value and book value of shareholders' equity, highlighting an unrecognized surplus value if the ratio is greater than unity.

⁴³ F. Gu, B. Lev, *Markets in Intangibles: Patent Licensing*, in Working Paper of New York University, 2001

⁴⁴ L. Guatri, *Il differenziale fantasma: i beni immateriali nella determinazione del reddito e nella valutazione delle imprese*, in Finanza, marketing e produzione, 1989, 1.

The indicator is simple, reliable (being based on an objective stock market price and on a net equity taken from the balance sheet) and easily available, but this applies - unfortunately - only to the small group (at least in Italy) of companies listed.

- **Real options and earn-out clauses:** The valuation of patents, especially if relating to inventions not yet consolidated in terms of expected economic results, as well as for a start-up, typically involves high profiles of uncertainty and uncertainty which are also reflected in the difficulty in estimating the cash flows (or income) deriving from their exploitation. Real options⁴⁵ make it possible to include elements of flexibility in the estimation model, incorporating market reactions, which are often so difficult to predict. It is thus possible to have options for deferral, temporary suspension, abandonment, contraction or - in a more optimistic sense - of expansion or development, which confer elasticity and adaptability to patented inventions, increasing their potential value. Useful links can be established between earn out and real options, contractually codifying the economic aspects of possible and uncertain events.

The decision to proceed or not with the patenting of an industrial invention derives not only from the analysis of its effective patentability⁴⁶ but also from considerations of economic convenience, inherent in the costs to be incurred for the patenting (and, above all, for the extensions international) and, in particular, the effective usability of the invention by third parties. If patenting guarantees the owner of the invention exclusive and proprietary rights, on the other hand it makes it public and therefore much easier to copy (through a "design-around road map"): the strategic decision in many cases is not looks quite easy. The timing of the patenting also takes on delicate aspects, when it is considered that a too early request may not be adequately supported or reduce the temporal usability of the exclusivity, for inventions not yet economically exploitable; on the other hand, excessive procrastination could allow others to appropriate the exclusivity of the invention.

The problem is well known, for example, to pharmaceutical companies, which typically patent active ingredients when the experimental phases in the laboratory and on animals begin, coinciding with a growing and not always controllable publicity of the results.

Know-how⁴⁷ and industrial secrets arise from the research activity within the company which detects as hidden knowledge, being a knowledge normally documented and codified (at product and / or process level) but difficult to find and characterized by essential information asymmetries between the inside and the outside. The evaluation of know-how and industrial secrets must consider their reduced or often non-existent marketability, at least independently. In evaluating inventions, the main problem is represented by

⁴⁵ H.T.J. Smith, L. Trigeorgis, *Strategic Investment. Real Options and Games*, 2004, Princeton University Press; A. Micalizzi, *Opzioni reali: logiche e casi di valutazione degli investimenti in contesti di incertezza*, Milano, 1997.

⁴⁶ Art. 45 of Legislative Decree no. 30/2005 lists a series of realities which, not being considered inventions, are not patentable

⁴⁷ S. Ignelzi, (2007), *Il problema della definizione giuridica di know-how. Know-how industriale e know-how commerciale* - in <http://www.finanzaediritto.it/articolo.php?a=569>

the estimation of the risk of their failure, in terms of expected cash flows or income but in the final balance not realized. Software evaluation⁴⁸ is typically complex, subject to copyright law. Its easy transferability (even simply with a download via the Internet) makes it particularly exposed to copying and the confidentiality of source codes is, in this context, essential (Microsoft Windows source codes are, like the chemical formula of Coca Cola, between the most protected secrets in the world).

In the third chapter we will see how these aspects are treated and overcome when we are faced with a real case, which an investment committee has to face and evaluate.

⁴⁸ M. Denne, J. Cleland-Huang, *Software by Numbers*, Prentice Hall, New Jersey, 2004

3 Start-up evaluation: Holey

The start-up that we are going to evaluate as a case study is a project that takes the name of Holey.

Holey is an innovative start-up that wants to revolutionize the design of customized orthopaedic braces and the production process, thus becoming a leader in the market. It seeks dynamic solutions that adapt perfectly to the patient and the healthcare world and with particular attention to detail.

3.1 Executive Summary and SWOT Analysis of the start-up

HOLEY was established on 21 June 2016 and operates in the field of innovative medical and/or paramedical equipment in the orthopaedics sector. More specifically, Holey has a hardware and software platform capable of creating 3D printable orthopaedic devices that aim to overcome certain problems related to traditional plaster.

Figure 2: Holey solution



**LIGHTWEIGHT AND
LESS BULKY**

ALL IN ONE

**WATER
FRIENDLY**

Source: Holey Corporate Overview

The business model, whose operation is based on the creation of preventive agreements with potential customers, such as private and affiliated health facilities, orthopaedic laboratories and public health facilities, is divided into 3 revenue lines. The revenue model for Holey is a hybrid model between direct sale and "pay per use" loan.

The end user is the patient who will wear the device.

To reach potential customers, the promoters are using as channels the sales networks of companies specialized in the resale of medical equipment or ICT solutions, which constitute an already established channel in health facilities. An agreement has already been entered into with Consulthink S.p.A., which will act as a reseller at INAIL.

The marketing and communication strategy is based on a double approach:

- on the one hand, to reach private and affiliated hospitals and medical staff by participating in congress and trade fair events and direct e-mail marketing
- on the other hand, to educate possible users regarding the existence of an alternative to traditional plaster so that they are the first to request access to this type of brace.

In order to reach the largest number of customers in the shortest possible time, agreements will be signed with resale agencies specialized in the orthopaedic sector, according to the promoters.

Below is a SWOT analysis which summarizes the considerations relating to the project:

Table 14: SWOT analysis

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> ▪ Team: the team is made up of highly qualified and dedicated professionals in the sector. ▪ Idea: an innovative, appreciated and shared idea, which could potentially overcome many of the problems associated with traditional plaster. The structure is, in fact, in hypoallergenic and biocompatible plastic; it weighs very little and is able to avoid all the typical complications of gypsum, such as fungi, skin diseases, dermatitis and compartment syndrome (which ranks among the most serious complications). Not to mention that it is washable and therefore also allows greater patient hygiene. ▪ Technology 3D: innovative and constantly evolving technology that opens up scenarios that were once unimaginable, which presents a considerable reduction in processing times as well as allowing production customization. ▪ Brace realization times: Holey is able to make the brace with significantly shorter times than those used by the main-only national competitor PlayCast. 	<ul style="list-style-type: none"> ▪ Patentability: the complexity and regulatory gaps on the subject, as well as the wide differences between one country and another, lead to a high risk of inadequate protection of the idea based on the use of software. Not all programs are, in fact, patentable, but only those that produce a "technical effect", whether new or non-existing, and innovative are patentable. The definition of "technical effect" is not easy. In principle, it is considered that it exists when the program allows to perform a function other than the normal interaction with the machine. The "Holey" software does not meet the requirements for its patentability. ▪ Ability to replace traditional systems: the Holey brace is not able to replace traditional gypsum with regard to more complex pathologies, which require the limb to be immobilized in a very important way; for the simpler pathologies the current guardians are considered effective and the propensity to change is low. In fact, there is also a perception of economic inconvenience, since operators should, however, maintain, for the above, the operation of gypsum for more complex pathologies. ▪ Test timing and 3D technological evolution: the time required for the organization and implementation of clinical tests for each type of brace developed is significant. This aspect must be evaluated bearing in mind that the evolution times of 3D technology are very fast. ▪ CE Mark: medical devices, within the European Community, are subjected to the compliance check of the "medical devices"

	<p>Directive which classifies them with respect to their risk. Class I represents the lowest risk devices; for them it is the manufacturer himself who can declare conformity with the aforementioned directive. In the context of 3D print, custom made devices are particularly relevant, since customization is the main advantage of this technology. For custom made devices, the affixing of the CE mark is not required. This expresses, on the one hand, an advantage, since the process for marketing the product is shorter; on the other hand, however, the absence of this trademark limits the circulation of the product and does not allow the same degree of trust to be recognized, even by operators in the sector, which could allow it to penetrate the market more effectively. The “Holey” product does not currently have the CE mark.</p> <ul style="list-style-type: none"> ▪ Manipulation in the application phases of the cast: generally, the affected part is handled before applying each cast. While the cast is being applied, the limb is kept in the correct position as much as possible, increasing or decreasing tension as needed and in order to avoid skin ulcers. Furthermore, a slight pressure is exerted necessary to maintain the position obtained with the manipulation. These manipulation operations, deemed necessary in some cases, do not seem to be so free-effective with the use of a Holey brace. ▪ Emergency cases: the 3D printing times of a brace range from 4 to 6 hours; this precludes the applicability of this solution in emergency situations, such as those that normally occur in the emergency room. ▪ Fixed costs and customization: Holey reports that the contract with INAIL, the main state and first customer, provided for several customizations. The customization of a service/product limits scalability: the more the business refers to a personalized service-product, the less likely it is to adhere to the concept of scalability. ▪ Prototype for upper limb only: the Holey product is currently available for the upper limbs only, typically forearm, wrist, hand. The brace for the lower limb is being tested. This further restricts the reference market.
OPPORTUNITY	THREATS

<ul style="list-style-type: none"> ▪ Technological evolution - innovation: the 3D printer market is rapidly evolving and could lead to more effective solutions for the treatment of the most complex pathologies. ▪ Advertisement in the October 2019 issue of GIOT (Italian Journal of Orthopedics and Traumatology) costing € 1,500 which has a circulation of 5,000 hard copies and 4,000 email addresses. Participation in trade fairs and congresses in 2019. 	<ul style="list-style-type: none"> ▪ Structure of the medical-health system: the organization of the national health system represents a significant barrier to the entry and expansion of such devices.
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Source: Holey, own calculations

3.2 Evaluation driver

3.2.1 Business Model

The initiative presented jointly exploits the opportunities offered by the 3D printer market and the application of this technology in the medical field, as well as offering itself as a way to overcome the limits of traditional gypsum.

The applications of 3D printing in the medical sector are numerous. Among the main ones, there is the possibility of creating patient specific organ models in order to support surgeons in pre and intra operative planning. This area of application is called rapid prototyping for surgical planning. Fields of application currently being explored include orthopaedic, otolaryngology and cardiovascular surgery. We highlight the innovative impact made by 3D printing in the abdominal surgery sector, a branch in which this technology is currently very limited.

The revolution introduced by 3D printing in orthopaedics started a few years ago. Thanks to SLS technology (selective laser sintering) and the use of Windoform GT material, a significant step forward has been made in the field of generating generative orthoses. The face of orthopaedics changes, therefore, which abandons the old plaster to embrace the new 3D printed braces, definitely more ergonomic and precise from a therapeutic point of view. From whiplash to back pain, the orthosis increasingly makes use of 3D devices for the treatment, functional rehabilitation and rehabilitation of many pathologies: from anklets and knee pads, up to orthopaedic corsets and lumbar belts. The 3D orthosis is also used for preventive purposes in patients at risk of osteoporosis.

The success of this printing method is certainly its low cost as well as the possibility, common to all 3D printing technologies, to create highly customized models cut directly to the needs of the end user. One of the most obvious advantages of the 3D printed orthosis is represented by the fact that the additive prosthesis adapts perfectly to the part of the body to which it must be applied, being modeled specifically

for the person who will wear it and made with very high precision techniques. 3D printing applied to orthopedics also has an undoubted aesthetic advantage, since the orthosis is made according to the patient's anatomical needs. Therefore, at the same time, high-level performance and high aesthetic and ergonomic comfort result.

The report by prof. Poggi entitled "3D printing of CT dataset: validation of an open source and consumer-available workflow" (2015) deals with the evaluation of the accuracy of 3D objects created using commercial 3D printers and open source software. The results of the study document how the low-cost workflow demonstrates the same accuracy as the data found in the literature, generally the result of more expensive hardware and proprietary software.

On the regulatory side, the diffusion of a Holey medical device within the European Community is facilitated by its characteristic of being "custom made" and, therefore, free from the CE marking. The declaration of conformity with the essential requirements of the relevant community directive is made by the manufacturer. The responsibility is shared between the latter and the doctor who issues the prescription.

Holey's idea of introducing an integrated system for the production of custom-made 3D printable orthopaedic braces, which can replace traditional gypsum and commercial braces in sizes, aims to overcome certain objective limits associated with the use of traditional gypsum. This technique is, in fact, not very "friendly" both for the patient (itchy "stucco" with a heavy weight for an upper limb; appearance of unpleasant smell and discomfort of various genesis at the epidermal level), and for the healthcare worker removal site: the removal operations of the plaster braces require the exercise of a moderate pressure on the product and often require postures that are not comfortable for the operator, due to the need to keep the brace in position during the cut following its progress , with intervention times that are affected by this need (on average, 25-30 minutes).

Retracing the elements that play a fundamental role in the evaluation of a start-up and with the help of the BMC, let's deepen the characteristics of the start-up HOLEY:

Vision

Currently, the most widely used solution for immobilization of a limb is orthopedic plaster. Despite its frequent use, this type of treatment has numerous disadvantages both for the patient, for the medical staff, and for the health facility.

As an alternative to gypsum, standard commercial braces can be used in some cases, which can be purchased in orthopaedic health care facilities.

Some complex diseases require the use of custom-made orthopaedic braces. These braces are made in orthopaedic workshops by highly specialized personnel, which takes between 2 and 4 weeks for processing.

Holey has developed a hardware and software platform capable of creating 3D printable orthopaedic braces, which can replace both traditional gypsum (in certain cases), and traditional commercial braces in sizes and custom-made braces made with semi- handcrafted.

The platform was entirely developed and designed within Holey and is capable of producing braces for the upper limb, but will be updated to be able to create a wide range of braces to immobilize and support different parts of the body.

The vision of Holey is inspired by the attitude of this new material and the potential of 3D printing to make immobilization of a limb (or other part of the body) a less traumatic experience, placing the patient at the centre of the process. The artefacts have a lower weight and a greater hold and dry faster. The material, extremely stable and hard, is very light.

Advantages counterbalanced by costs for the installation of the equipment that are still fairly high (although the 3D printer market started in the 1980s is not yet fully mature and fully spread) and by a dismantling of the material that is not entirely hassle free. Furthermore, the resin plaster allows a worse transpiration than the traditional plaster version.

Mission

Holey is an innovative, appreciated and shared idea that would solve many problems related to traditional plaster. The Holey orthopaedic brace offers the same protection as traditional gypsum and is “tailored to the patient” making it easy to apply and customizable in structure and colours. In addition, thanks to its particular perforated geometry and closures, the brace is removable, light, breathable, hypoallergenic and water resistant.

The service and the innovative process

The brace designed by Holey is available for the upper limb areas (hand, wrist, forearm); it is light and waterproof and supports the fractured area during the healing period without impeding the performance of daily activities such as showering. The material used for the printing is hypoallergenic, while the perforation of the brace makes it perfectly breathable, which limits the annoying itching associated with plaster. It has been shown to reduce the risk of the patient developing complications after the immobilization period. In addition to designing the brace, the start-up Holey has also developed a platform (Holey Brace Platform) that allows specialized personnel to create an orthopedic brace tailored to the patient's needs in a few and semi-automatic steps. Alternatively, operators can use the scanner created by the start-up to obtain a scan of the patient's arm in a few seconds and select the characteristics required of the brace, after which it will be enough to launch the print and the order.

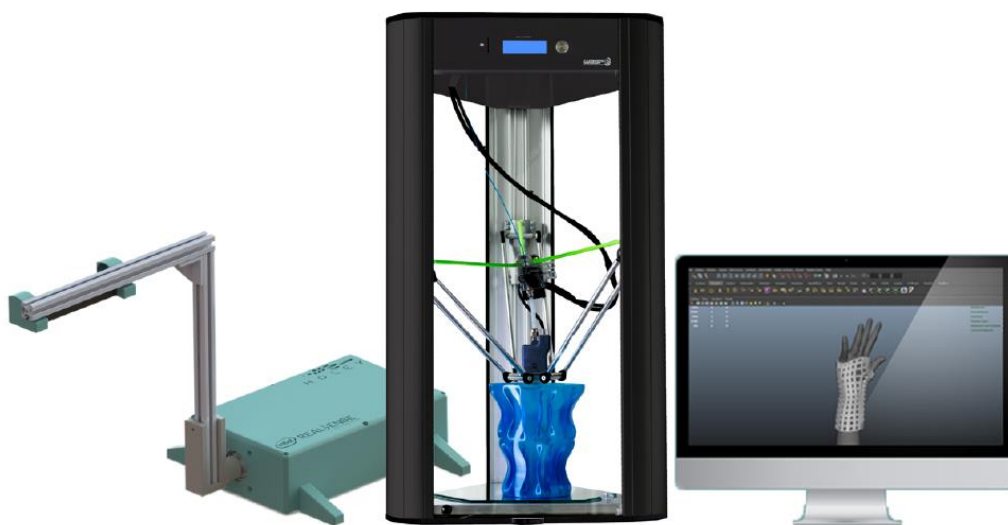
The process of making a "Holey" brace begins with the 3D scan of the affected limb which is carried out directly in the health facility during the patient's visit or in an orthopedic workshop. The three-dimensional

image is acquired by the software that automatically generates the exoskeleton and allows any changes. The 3D model of the brace is 3D printed using a biocompatible plastic material. In addition, since the brace is made up of two distinct parts, its application is easy and painless.

The Production Process is divided into three phases:

- An innovative and patented 3D scanner, capable of fully automatically acquiring a 360 ° scan of the limb or the affected part in less than 30 seconds;
- It is a software, the heart of the platform, which starting from the 3D scan is able to automatically generate the 3D model of the brace perfectly tailored to the patient. In addition, the healthcare professional will be free to make changes to the geometry of the brace to meet the patient's clinical and personal needs. To quantify the value and power of the software, 2 software house quotes were requested, which attributed a commercial value between € 200,000 and € 250,000;
- It is a 3D printer that will materially make the brace, using hypoallergenic, resistant and recyclable plastic materials. The platform was entirely developed and designed within Holey. The process of making a brace with Holey begins with the 3D scan of the affected limb, which is carried out directly in the healthcare facility during the visit to the patient or in an orthopedic workshop. The three-dimensional image is acquired by the software that automatically generates the exoskeleton and allows any changes. The 3D model of the brace is 3D printed using a biocompatible plastic material.

Figure 3: Holey Platform



Source 1: Holey Corporate Overview

Scanning is fast and simple, in fact the scanner has been specially developed for this type of application, managing to acquire the 360 ° image of the limb in a totally automatic way in less than 30 seconds. It is therefore sufficient for the patient to place the affected part on the scanner, which automatically imports the 3D image onto the computer. In addition, the software allows modifications regarding personalization according to the patient's clinical and personal needs. The image is sent to the printer which will print the device without pauses in the shortest possible time. Once these steps have been completed, the device is ready to be applied to the patient's limb.

In the event of an agreement for the loan for use of the device dedicated to scanning (with in-house printing of the device), an aspect of weakness emerged in the production process: the acquisition of the scan takes place via a back office application that the clinic communicates with the Holey printing center, which remotely receives the file and sends it to print. With the clinics, in the agreement, it was defined that these acquisitions will take place in the early hours of the morning and in the second time slot of the afternoon, in order to respect the guaranteed processing times (24h), as the printing of a guardian requires 4-6 hours approx. It is foreseeable that in a private structure, specialist visits take place continuously, with peaks in requests on certain days of the week; this could create logistical and production difficulties, leading to an overload of work at certain times of the day. This limit could be exceeded by purchasing a greater number of 3D printers, which must be evaluated in terms of efficiency and cost-effectiveness of the "Holey" production process.

From the studies and sector publications examined, as well as from the interviews held with sector operators, the technical validity of the 3D printed brace is not called into question; some perplexity exists, however, in relation to the therapeutic reliability-efficacy of this device in extreme orthopedic situations (obese patients, displaced fractures, fracture to be put in traction, use of screws and bolts simultaneously with immobilization, stability dictated by the thickness of the brace for the containment of accidental impacts).

There are also elements of distrust in relation to the lack of knowledge of 3D printing mechanisms and the risk of errors with consequent inefficiencies in the service offered by the healthcare facility. Most of the problems that may occur during the printing of a 3D object involve the adhesion of the first layer, that is, the engraftment of the first layer of extruded material (which forms the base of the object) to the printing surface. If the first layer of material does not adhere adequately to the surface, the printing will inevitably be defective and it will not likely be possible to complete it. The containment of the risk of errors implies that the printer has a solid structure and allows, if correctly calibrated, to obtain quality objects. In this regard, further technical aspects should not be underestimated, such as: tension of the driving belts, sudden changes in electric current, quality of the connection to the PC, printing surface, material used and cleaning of the parts. The 3D printers currently used for the production of Holey are, in general, all those

available on the market; in fact, no specific model has been identified. This allows - potentially - to use the printer that offers the best performance and is in step with the evolutions of the specific technology; it is also clear that there may be operational (and cost) problems related to the possible transition from a model in use to a higher performance type of printer.

From an operational point of view, the proposed innovation does not present critical issues in itself, but concerns related to the level of reliability, effectiveness and efficiency of the guardian; this is obviously physiological with respect to any innovation, especially in particular areas such as healthcare, there are, however, some elements of attention that could affect the large-scale development of the product-service proposed by Holey and which are indicated below:

- The process of inserting an alternative product to gypsum could be complex and burdensome for the healthcare facility, both public (in particular) and private. At present, in fact, having assessed the level of maturity of the 3D technology, it does not seem possible to complete a complete disposal of the "plaster room" and of every operational aspect connected to it, since for particular types the "Holey" product is not (or not is perceived as) effective. It seems, therefore, that only a hypothesis of the presence and joint management of the two solutions (traditional system - "Holey" system) by the target health facilities seems to be envisaged.
- The "Holey" brace appears, at present, also evaluated as reported above, to be more of a substitute for the traditional brace than for the "plaster" solution; in this sense, the price lever does not seem to be a marketing reference on which to focus for the diffusion of the product-service.
- Commercial option "Loan for use of the scanner and software, with print by Holey of the guardian": if the healthcare facility were to opt for this commercial agreement (on which Holey seems to be focusing for business development), there would seem to be a step which denotes an ineffectiveness of the process; the patient, in fact, would leave the structure with a temporary immobilization of the interested part, and then return to the clinic after 24 hours (maximum) for the application of the brace (which Holey will have printed at its site and delivered to the structure within the established times from the agreements).
- O&M: in the description of the agreements and the process, the management of machine and software maintenance is not well quantified, both in terms of cost and time. What is part of ordinary maintenance and what is extraordinary. 3D printers, unlike software and

scanners which are owned and designed by Holey, are chosen on the market and there is no indication of any agreements regarding the maintenance and warranty of these printers. Holey reports that the maintenance fee is equal to € 100 / month for each agreement stipulated for routine maintenance of the software and scanner. However, the timing and methods of supplying these aspects are not known.

Value proposition

- Mass-personalization: a new business frontier that combines the flexibility and customization of tailor-made products with the low unit costs associated with mass production. In addition to a customization of the finished product, in terms of size, colour and flexibility, so is the business model: Holey works in partnership with its customers to offer products or services in a unique way for each customer.
- Managing the Supply Chain: the 3D scanner created by the start-up is able to fully automatically acquire a 360 ° scan of the limb or the affected part in less than 30 seconds and print it in a few minutes. This allows to eliminate the spaces and warehouse costs for the raw material and the spaces necessary for the production of traditional gypsum or braces. Thus offering a "zero inventory" solution and triggering an "on-demand" production mechanism.
- Design Freedom: 3D printing allows you to freely define your product design. By leveraging the capabilities of a 3D printer, it is possible to create devices with a combination of advanced properties (for example, lighter, stronger, cheaper, more complex).
- Speed: it is a flexible production with reduced times.
- Intelligence: in the world of industry 4.0, 3D printers are connected not only with the operator but also integrated with software, artificial intelligence and the cloud.

Business Model

As indicated by the Proposers, the business model is implemented by activating 3 sales channels at the same time:

1. Partnership agreements with companies specializing in the resale of medical equipment or ICT solutions
2. Agreements for the supply and resale of the guardian in public and private health structures
3. Agreements for the supply and resale of the brace in orthopedic laboratories

The expected revenues derive mainly from fees commensurate with the value of the number of guardians produced and sold, as well as from the sales fees and the fees for the loan for use of the necessary equipment.

From the analysis of the business model, some critical points emerge that significantly constrain the development of the Holey platform:

- Point 1: to ensure the growth of the business, it is essential that a critical mass not only of patient-consumers, but also and above all of health facilities where the same patients can implement their purchase choices for the "Holey" brace is developed . Without a minimum volume of "Holey affiliated" structures and consumers sufficiently informed of this possibility, the platform has limited investment and growth capabilities. From this point of view, the market penetration strategy - on both the aforementioned fronts - is currently not sufficiently clear and defined. Generic and unfocused marketing does not appear suitable for achieving the goal.
- Point 2: an important barrier to entry is given by the scepticism of the medical staff. A large-scale development of a medical device occurs only if the specialist sponsors and supports it. A clear and determined appreciation from the scientific community would help in the promotion and use of the same. At present, the opinion of doctors on the instrument, strictly speaking, is not negative; the term of comparison for insiders is, however, the size brace that can be purchased in an orthopaedic supply store rather than plaster. In fact, the emergency room doctors interviewed show scepticism in the use of this brace in cases of emergency and for certain pathologies, as well as denounce a personal unfamiliarity with this innovation, probably due to the non-maturity of the market segment in question;
- Point 3: similar scepticism, as mentioned in point 2 above, also affects the end user who does not have the information that allows him to consciously and critically choose the options that the health facility can offer him.

Intellectual property

The scanner designed and used by Holey is protected by an Italian patent, with a PCT currently being validated. Software, by its very nature, is not in itself suitable for other forms of intellectual property protection besides copyright.

Commercial strategy

Regarding the ability to penetrate its market, Holey intends to make use above all of the internal capacity of its commercial staff, to reach directly and without intermediaries as large a number of healthcare facilities as possible. Holey however envisages the use of companies specialized in the resale of medical equipment or ICT solutions - an agreement is currently in place with Consulthink S.p.A. - to whom to entrust the agreement activities of the commercial partners.

It is believed that the commercial strategy outlined is not adequately structured and articulated. There seems to be an unclear and, in some ways, generic vision of the paths to be followed to reach the declared commercial targets, as well as an incomplete indication of the commercial levers to be activated. In this regard, it should be considered that the advertising of medical devices to the public in Italy follows a dedicated legislation. The requirements that the legislation imposes on advertising messages are similar to those required for pharmaceutical products, and are aimed at guaranteeing the protection of patients' health (Legislative Decree 46/97 and updated in 2010 with indications and clarifications in relation to advertising through internet, sms, mms and e-mail).

The main challenge will be to overcome, in suitable ways, the important barrier to entry represented by a scientific community that is observing this technology with high interest, but is still perplexed about the effectiveness and safety of the guardian under discussion. In this regard, it should not be overlooked that the treatment requires a medical prescription and that, consequently, the first market to attack is represented by specialist doctors. Given this condition, clinical structures represent, in hindsight, a second market, driven by the first.

Finally, consider the fact that non-dissemination in the "public health" area limits the entry and dissemination in the private sphere of this innovation, also by reason of aspects connected to the reliability of the instrument and the responsibility that derives from it for those who prescribes.

Status of commercial agreements

An agreement is in place with Consulthink S.p.A., which will act as reseller at INAIL .. Holey makes use of SEO tools, direct e-mail marketing and presence at trade fairs as a lead generated to reach new customers. As you can learn from the website, Holey has finalized a commercial agreement with the Nuova Villa Claudia facility in Rome. The agreement provides for the provision of the service on loan for use of the scanner and software and the in-house printing of the guardians. Holey appears to be in talks with two additional structures: Villa Mafalda in Rome and a multi-specialist clinic based in Portici (Na).

Current operation

The project is based on three possible options to generate revenue.

Holey builds loyalty and contracts, in three different ways, of private clinics and public hospitals, as well as taking advantage of the widespread presence of shops dedicated to orthopaedics, where the tutor creation services will be activated.

The business model envisages that the boost in sales comes from the meetings and the education process on this new instrumentation that can be triggered by coming into contact with the population of orthopaedic doctors.

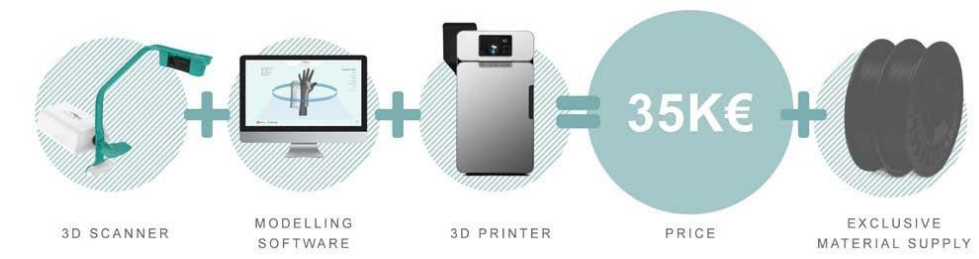
The revenue model is, therefore, based on a hybrid model between direct sales and "pay per use" loan to allow greater flexibility according to customer needs.

The following diagrams are a summary of the Holey platform organization process.

1. Platform Sale

It provides for the sale of the entire platform (3D Scanner, Software, 3D Printer) together with an initial supply of material for the realization of the braces, installation and transport, with a price to the healthcare facility of € 35,000 (€ 28,000 net margins for retailers), with a gross margin of € 20,000. For the years following the first, for those who purchase the Holey Brace Creator platform with the Platform Sale solution, an annual fee will be paid for license renewal and software updates. The annual license is priced at € 7,000.

Figure 4: Platform Sale

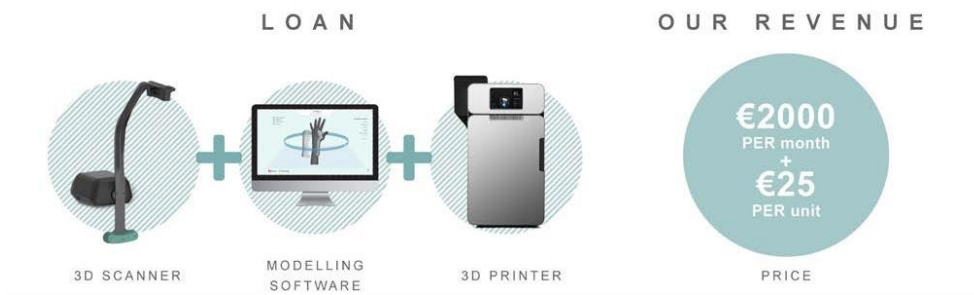


Source: Holey Corporate Overview

2. Subscription

The 2nd solution offers the platform on loan for use with a fixed fee of € 2,000 per month and a unit price towards the healthcare facility of €25 (€20 net of the margins for retailers), with a gross margin of €12.

Figure 5: Subscription - pay per use for small facilities

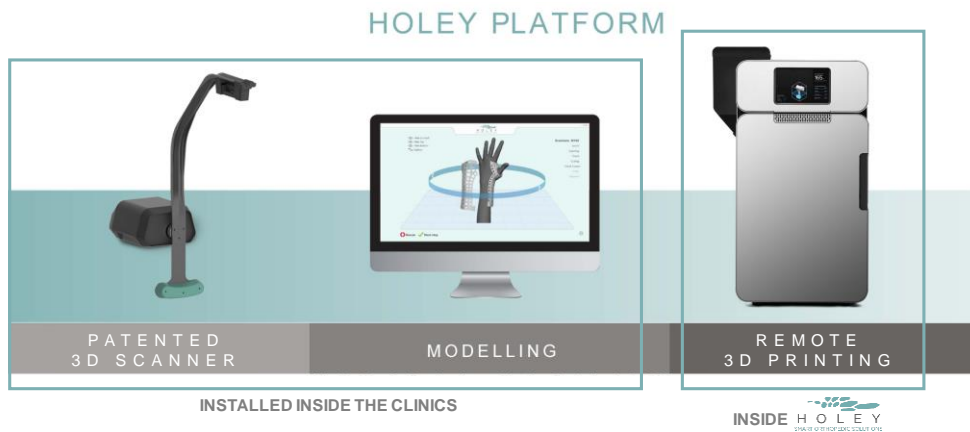


Source: Holey Corporate Overview

3. Loan for Use

The third option offers the platform on loan for use to the healthcare facility of the scanner and software, but the printing of the guardian takes place at the Holey spaces, which undertakes to deliver the same within 24 hours.

Figure 6: Loan for Use



Source: Holey Corporate Overview

Using retailers specialized in the marketing of medical and ICT products as a sales channel, the billing process will be as follows:

PATIENT → HEALTHCARE → DEALER → HOLEY

Each dealer will receive a fee per trade.

In summary, the business model is based on the following elements of uniqueness:

- Partnership agreements with private and affiliated health facilities, orthopedic laboratories and public hospitals;
- Commercial agreements with resale agencies specialized in the orthopedic sector;

- Development of a database of registered customers that will represent a tool for promotional campaigns via mobile both by commercial partners and by non-profit organizations and associations;
- Definition of the price for the end user around € 120. Undertake the procedural process through the AGCM for the creation of an agreement between Holey and our client private clinics;
- Insert in the contract with the clinics a clause defining the sale price of HOLEY products, so as to prevent a misalignment and diminish the image and prestige of the brand and product;
- Promotions to clinics by offering a "free" brace for every 10 sold, this should incentivize clinics to keep prices low to increase sales.

The revenue model for Holey is essentially based on agreements with structures, especially of a private nature, where users can make the request to wear a Holey brace instead of the traditional plaster and / or the classic braces on the market today. Holey derives its turnover mainly from the following items:

- Revenues from dealers represented by specialized retailers (present to a negligible extent compared to the other items);
- Revenues deriving from the "Platform Sale" agreement (business line that will reduce its presence over time);
- Revenues deriving from the "Loan of use" agreements for the scanner and software, but with the guardian's in-house printing. Preferred option to maintain and better manage the loyalty relationship with the structures, the definition of the final price and create a flow of revenues also from the O&M operations of the machines.

Marketing strategies and new customer acquisition

The marketing and communication strategy is based on a double approach:

- contact with private and affiliated hospitals and medical staff through participation in congress and fair events and direct e-mail marketing;
- disseminate the knowledge, among potential users, of the existence of an alternative to traditional plaster. In order to reach the largest number of customers in the shortest possible time, agreements will be stipulated with resale agencies specialized in the orthopedic sector, with which it is also possible to divide the costs of participation in events and conferences organized in the various sectors of interest.

a. Exhibitions

Participation in sector fairs is expected with a stand equipped for demos. The aim will be to promote the product with medical staff, increase the degree of acceptance of the technology and collect feedback and contacts, which will constitute the leads for the planned e-mail advertising campaigns. The fairs we could participate in on an annual basis will be:

1. Maker Faire
2. Simfer (Società Italiana di Medicina Fisica e Riabilitativa)
3. SIOT (Società Italiana di Ortopedia e Traumatologia)
4. SICOOP (Società Italiana Chirurghi Ortopedici dell'Ospedalità Privata)
5. AUOT (Accademia Universitaria di Ortopedia e Traumatologia)
6. OTODI (Ortopedici e Traumatologi Ospedalieri Italiani)
7. SITOP (Società Italiana di Ortopedia e Traumatologia Pediatrica)
8. ISORTECS (Società Italiana di Scienze e Tecniche Ortopediche)
9. ISPO (International Society for Prosthetics and Orthotics)
10. Expo-sanità
11. Medica

The average cost of participation for each individual event including rent, set-up and travel is about € 20,000, while the audience present at these events varies between 300 and 5000 participants from different countries.

b. E-mail Advertising

Among the low-cost marketing tools, B2B e-mail marketing is one of the least expensive and most effective, but above all it is a tool that allows a direct promotional push with the aim of creating demand.

The integration of a database of profiled and targeted B2B lists with a complete professional service should allow you to generate quality leads. We intend to use as a database the contacts collected during trade fairs and direct contacts received through our site, as well as databases present online. Furthermore, email marketing will not only be used as a simple lead generator, but also as a tool for drop marketing. By sending numerous and short messages for a specific period of time to customers or potential customers, it will be possible to maintain constant contact with your audience, so as to be always present.

c. Blogging

A blogging portal with the theme of orthopaedics and an editorial plan has been activated on the Holey website which includes both specialist and professional articles for doctors and general information articles for patients. Currently the blog receives 5.6K monthly visits from 5.2K unique users.

d. Permanent Demo

This marketing strategy provides for the choice of 4 structures on the Italian territory that meet certain requirements (high specialization in the orthopaedic sector, a good rating of scientific publications and a large number of patients) to which the supply and installation of a complete solution on free loan for 3 months, also renewable. In this way, according to Holey, strong product awareness will be created within

the scientific community and case reports will be produced in centres of excellence that can be used during scientific events to demonstrate the validity of the solution.

This activity has an estimated cost of € 50,000 for the construction and installation of the 4 platforms which will remain the property of Holey unless the structures concerned decide to acquire the solution on a permanent basis.

e. Customer Journey

By Customer Journey we mean the itinerary that the customer takes when establishing a relationship with a company over time and in the various contact "environments", both offline and online. The stages are:

- I. **Awareness:** through online marketing campaigns and P.R. retailers, orthopaedists, physiatrists and health directors will be informed of the existence of a solution to the problems related to gypsum and prefabricated orthopaedic braces.
- II. **Familiarity:** by attending the most important trade fairs in the sector, clinical tests in various facilities, multimedia material (videos and tutorials) and live demos, potential customers will be able to familiarize themselves and learn about the product, so as to guide them in their purchase choice.
- III. **Consideration:** clinical tests and related scientific publications will be used to strengthen the consideration and guide the purchase choice towards products and services of this nature.
- IV. **Sale:** the sale is carried out in cooperation with retailers.
- V. **Loyalty:** with tools such as drop email marketing, periodic contacts with retailers and customer care, customer loyalty will be maintained.

f. Patients Journey

Although the paying customers are the healthcare facilities, we want to develop a communication strategy also aimed at patients, as end users. This communication is intended to encourage patients to request from their doctors to be able to take advantage of a treatment that uses Holey braces.

Also in this case the path is divided into several phases:

- I. **Awareness:** through online marketing campaigns based on the main social networks, potential end users (patients) will be aware of the existence of an alternative to traditional plaster or as an alternative to prefabricated sizing braces.
- II. **Consideration:** through online marketing campaigns based on the main social networks, videos and interviews of success cases of patients who have used the braces made with the Holey platform for their treatment will be disseminated. For this activity, the use of testimonials from the world of sport is envisaged, if possible.

- III. **Need:** taking advantage of the two previous phases, the patient will be motivated to ask the doctor to be treated with a 3D printed brace.

3.2.2 Competitiveness Analysis

The development of health systems depends, to a large extent, on the ability to govern the entry of innovative technologies into clinical practice, according to criteria that ensure positive results in terms of health and quality of care, within a framework of financial sustainability, equity and integration of interventions.

The global market for 3D printed orthopedic devices will grow by \$ 1.24 billion in 2019-2023 and is expected to record a CAGR close to 26% over the same time frame, according to Technavio's latest market research report.

Table 15: key points Orthopedic 3D printing devices market

KEY TREND	Increased outsourcing of non-emergency orthopaedic activity
MARKET DRIVE	Introduction of new technological products launched in the key market Increased incidence of accidental injuries
FORECAST	The market is designed to grow to a double digit CARG

Source: Technavio, own calculations

The increased demand for custom orthopedic devices is one of the main reasons that will drive the market for orthopedic 3D printing devices. The adoption of 3D printing technologies is increasing significantly in the medical field as it uses diagnostic imaging to develop patient-specific devices and make surgical instrumentation. Clinicians can make custom implants that include complex shapes and geometric features, which is possible thanks to the ability to make additive layers in 3D printing. In addition, 3D printing aids in the development of custom surgical implants, designed to perfectly fit any anatomical defect or malformation. The image below shows the key numbers of the target market:

Figure 7: Global Orthopedic 3D printing devices market 2019 - 2023



Source 2: Technavio, Report 2019

The difference between the market values of 3D printed orthopedic devices and traditional medical devices is remarkable, as shown in the figure below. A CAGR so different between the traditional and the 3D market is dictated precisely by the innovative element of the 3D printer, a technology that will see an exponential growth in its application in the orthopedic sector and will be one of the main factors supporting the growth of the orthopedic device market.

Figure 8: Global Orthopedic braces and supports market 2019 - 2023

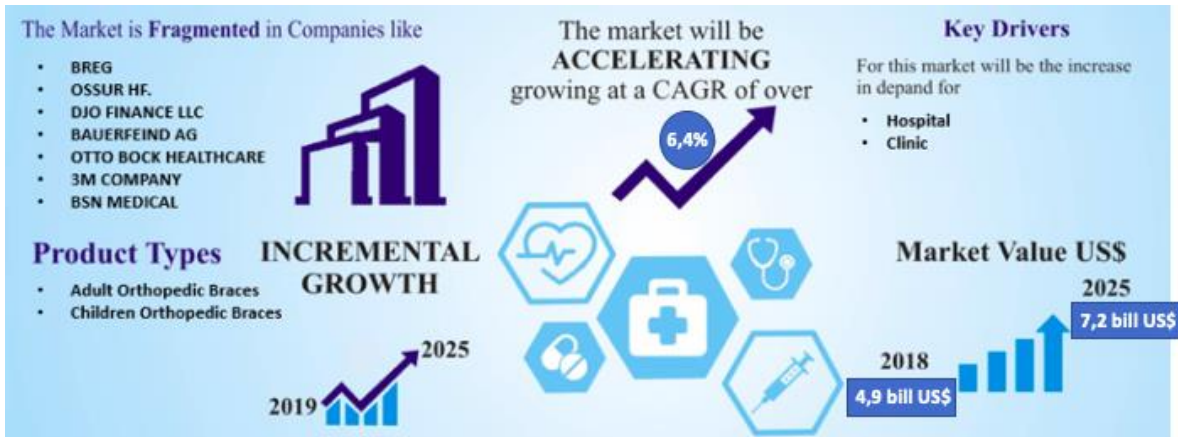


Source 3: Tecnavio, Report 2019

A key factor driving the growth of this industry globally and supporting the size of the market is the growing number of arthritis cases. The pain and stillness associated with arthritis can affect any joint in the body and can prevent patients from going through their daily routine. The growing prevalence of arthritis increases the demand for orthopedic braces and supports that can be used to facilitate physical movement and relieve arthritis symptoms. The incidence of arthritis will support the expansion of the market during the forecast period. This is not limited only to the traditional brace market but also to those in 3D printing. The professor. Perugia, Holey's scientific advisor, is working with Holey on the application of these braces to his patients operated on or treated for arthritis at the Mafalda Clinic in Rome.

As seen in the SWOT analysis, a Holey device is comparable-substitute, from a market perspective, more to a traditional brace than to plaster. Therefore, if we observe only this segment of the orthopedic device market, the following emerges:

Figure 9: Global Orthopedic Braces Market Research Report 2019



Source: The Market Reports 2019

A. INDUSTRY INSIGHTS: The size of the market was valued at more than \$ 4.9 billion in 2018 and is expected to see a CAGR of 6.4% over the period 2019-2025. The increase in the incidence of osteoarthritis is considered one of the key factors in the growth of this sector. It is the most common form of arthritis that affects the population of all ages. The Centres for Disease Control and Prevention (CDC) has estimated that nearly 78 million US adults over 18 years of age will be diagnosed with arthritis by 2040. Thus, people with arthritis form the largest consumer base for the orthopaedic industry. This aspect was also highlighted by prof. Perugia, Holey scientific consultant, personally interested in a support of this kind for his patients suffering from arthrosis.

The geriatric population is considered one of the major contributors to the demand for orthopaedic appliances and supports. This population is highly susceptible to musculoskeletal disorders. Bones and connective tissues, such as ligaments and cartilages, naturally weaken with growing age. This carries a high risk of muscle injury mainly in the knees and shoulders of the elderly. This further stiffens the joints, which increases the need for braces and supports to improve mobility. Hence, the growing geriatric population should push market growth.

Sports-related injuries are increasing with the growing number of sports activities. Athletes are focused on fitness-related activities like running, cycling, and more. While they get health benefits through such activities, they are prone to ligament injuries. Indoor athletes are at high risk of ankle ligament tear. Hence, they are expected to generate substantial demand for ankle braces. Athletes also use orthopedic braces to protect themselves from further injury during sports activities. It helps them to limit unwanted movements during matches, thus facilitating convenient play.

B. PRODUCT INSIGHTS: The orthopedic brace market is segmented into knee pads, ankles, backs, upper leg supports, ankles, hand, upper limb, shoulders. The increase in the prevalence of knee and ankle injuries has led to a great demand for these products. Knee braces and supports were the biggest revenue generator in 2018, due to the growing number of people suffering from knee joint related injuries.

C. END USE INSIGHTS: On the basis of the end customer, before the patient, the market is classified in orthopedic clinics, hospitals, over the counter (OTC) and other facilities. In 2018, orthopedic clinics held the largest market share for acute problems other than those caused by accidents or emergency situations. Related orthopedic appliances are designed to have lucrative growth for the manufacturer due to the easy availability of these products in retail pharmacies. Patients with acute muscle pain - without fractures - prefer OTC products available. Hospitals hold the significant market share linked to the increase in the number of hospital admissions for the treatment of traumatic and spinal injuries, bone fractures and injuries sustained in traffic accidents. Other facilities that require these products are trauma centres, sports academies, gymnasium pharmacies, spas and emergency centres.

D. REGIONAL INSIGHTS: In 2018, North America led the market. Europe is expected to show growth during the forecast period given the presence of well-developed healthcare infrastructure, availability of advanced products and skilled professionals. The growing demand for advanced therapies and products in Europe is another important factor expected to support the growth of the regional market. Asia is expected to show profitable CAGRs. Japan is an important market thanks to the presence of advanced manufacturing facilities and technologies.

E. MARKET SHARE INSIGHTS: some of the major companies operating in the international market include Breg, Inc.; DeRoyal Industries, Inc.; Otto Bock Healthcare GmbH; DJO Global, Inc.; Bauerfeind AG; Alcare Company Ltd.; Össur Corporate; Frank Stubbs Company, Inc.; and McDavid Knee Guard, Inc.; FLA Orthopedics, Inc.; Hely & Weber; and Aspen medical products.

The following table summarizes the competitive comparison between the Holey platform and some competitor platforms (Holey analysis):

Figure 10: Competitors

	 HOLEY	 ACTIVARMOR	 EXOVITE	 XKELET.	 Medi-Print	 Osteoid	 castprint
MARKET	ITALY	USA	NO YET	NO YET	NO YET	NO YET	LATVIA
EASY TO USE SCANNER	<input checked="" type="checkbox"/>						
1 CLICK MODELLING	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
BRACE PERSONALITATION	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
READY TO APPLY AFTER 3D PRINTING	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			
SUPPORT OR IMMOBILIZATION	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Source 4: Holey Corporate Overview

The competitive advantages highlighted by Holey over all competitors are the patent on the 3D scanner and the software, both owned by the Company.

- Scanning is a competitive advantage for Holey. The only scanners on the market that can effectively scan a fractured limb are manual ones, which are however very expensive and difficult to use and, therefore, impractical for medical purposes. The Holey scanner, on the other hand, was designed to solve these problems and offer a high definition image of the fractured limb at 360 °, all automatically in 30 seconds.
- The software, developed internally, is designed to be easy to use and intuitive in its application. It is also able to modify the 3D model of the brace, to allow medical staff to meet the patient's clinical and personal needs; it can be upgraded with various types of braces for different anatomical segments.

Despite the interest of several Italian research centres and the CNR, based on the above considerations and the following financials, the reference market will certainly be that of private structures, at least in the first instance. Indeed, it should be remembered that the system of health goods and services follows a logic that is partially different from that of market penetration of any other good. In fact, the Italian Public Health Authorities employ public resources for the purchase of medical devices and follow the logic of maximizing efficacy and efficiency and the need to comply with Community and national public law standards, which for example prescribe procedures publicly available for each tender-supply. It is therefore plausible that the health policies of regulation and control, as well as the organizational innovations that modify the structure of the demand, strongly influence the organization, structure and performance of the supply system for the public sector.

A small share of the public market could be conquered thanks to the presence on the Electronic Market of the Public Administration (MEPA), accessible for purchasing processes of an amount below the Community threshold, obviously conditioned by the formulation of the agreement. The telematics processes accompany the choices of centralization as facilitators of the meeting between supply and demand, but nevertheless there are some social and cultural barriers that hinder their diffusion, especially when the purchase choice concerns products such as health technologies or medical devices. characterized by an almost constant technological innovation, and by an information need on the specific product, also in terms of evaluation, which seems difficult to satisfy through technical data sheets and electronic price lists, for which the individual company and upstream clinicians could also boast preferences specifications that are difficult to meet in a standardized product market.

The competitive framework described above, combined with the considerations made in the previous paragraphs, highlights a scenario with an important barrier to entry. Moreover, the status of the Holey

project does not currently present any specific competitive advantages in terms of price compared to the brace, but shows comfort advantages compared to both the brace and traditional plaster.

To overcome this barrier to entry to the market, Holey should implement an important awareness campaign of the scientific community, placing the patient's needs at the centre of the process, guaranteeing and demonstrating the same flexibility, reliability and stability as traditional gypsum. This should be done as quickly as possible, as these are technologies that could quickly be overtaken by new discoveries. It is also important to agree with the largest possible number of retailers and private healthcare facilities, in order to acquire a garrison that guarantees the permanence of Holey in the long term, which would also allow investing in the development of 3D braces which, in perspective, they could release medicines, do telemedicine or something else.

3.2.3 Revenue & Cost lines

Let's see below in practice how Holey builds its revenues, for a period of 3 years, based on the options we have indicated above:

- A. **Platform Sale:** as mentioned above, in this case the sale of the entire platform (3D Scanner, Software, 3D Printer) is expected and the healthcare facility will pay € 35,000. For the years following the first, for those who purchase the Holey Brace Creator platform with the Platform Sale solution, an annual fee for license renewal and software updates of € 7,000 is expected.
- B. **Subscription:** the platform is offered on loan for use with a fixed fee of € 2,000 per month and a unit price for the health facility for small guardians of € 25 and € 40 for large guardians.

Figure 11: Holey's Revenue

TOTAL REVENUES (In Euro)	1	2	3
SERVICE/PRODUCT A	105.000	315.000	0
SERVICE/PRODUCT A SOFTWARE LICENSE	0	21.000	84.000
SERVICE/PRODUCT C	26.980	292.100	1.562.100
Total	131.980	628.100	1.646.100

SERVICE/PRODUCT A	1	2	3
Brace creator platform - nr	3	9	
Total revenues (in Euro)	105.000	340.000	100.000

SERVICE/PRODUCT A SOFTWARE LICENSE	1	2	3
Annual Software License - nr		3	12
Total revenues (in Euro)	0	21.000	84.000

SERVICE/PRODUCT B	1	2	3
Brace creator platform monthly fee - nr	11	115	615
Canon print small braces - nr	132	1.380	7.380
Canon print big braces - nr	42	690	3.690
Total revenues (in Euro)	26.980	292.100	1.562.100

Source: Business Plan Holey3D Mar19

In the revenue plan, the first year indicates a number of 3 type A agreements, this is because INAIL has already made a purchase for 3 units with the "Platform Sale" formula. Thanks to this partnership, Holey has carried out customization and integration actions of its software with the INAIL software, as well as installation and staff training activities, not yet quantified in terms of economic impact.

The Start-up Holey also intends to implement and prefer the option of Revenue C - Loan for use, not yet included in its economic plan because it is more articulated and in the definition phase. It is a loan for use of the scanner and software, with a fixed monthly fee of € 2,000 and with Holey printing of the guardian. What changes is the definition of the price for the end user of the brace, which is established upstream by Holey: € 120 / brace. According to Holey, this ensures greater patient protection and avoids price fluctuations that could compromise the saleability of the braces. The maintenance of this price will be guaranteed through the deposit procedure of the same at the Chamber of Commerce.

In a market, ideally, very competitive and with evolving technology, with a commercial strategy whose success is linked to individual agreements with health facilities, Holey has taken steps to define and deposit a reference price in the chamber of commerce. equal to € 120 per tutor, as well as below. This initiative to define a price is viewed positively in the light of what was presented in March 2019 in the "Document on the governance of medical devices". Among the fundamental points of the document: indications for the management of expenditure; the definition of homogeneous product clusters for competing purchases; a

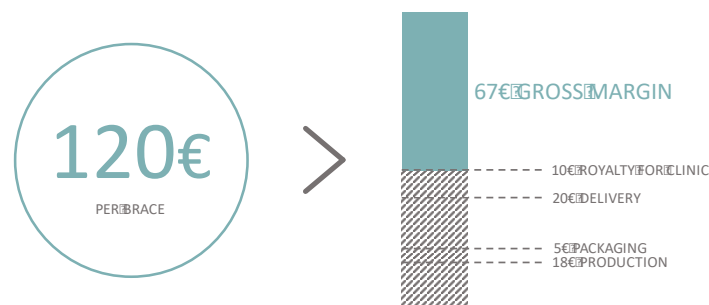
more stringent monitoring of prices, thanks also to electronic invoices; the impulse to centralized tenders; traceability of implantable medical devices and safety.

The purpose of the Document is to arrive at the definition of the reference price for the various product clusters, also providing for the involvement of the Antitrust Authority and the market so that it monitors any opportunistic behavior.

Ideally, Holey is suitable for both a public and private healthcare facility, as there is currently no specific market for this platform and the products similar to this brace are in line in terms of price, being the first company to deposit a fixed price could give it the advantage to have already gained market share and to meet the price requirement.

The figure below allows you to understand how the Holey team came to define the value of € 120 for each guardian:

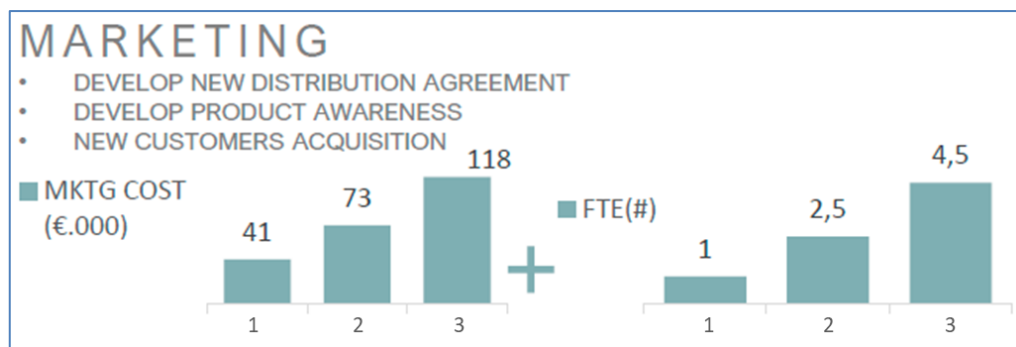
Figure 12: Pricing

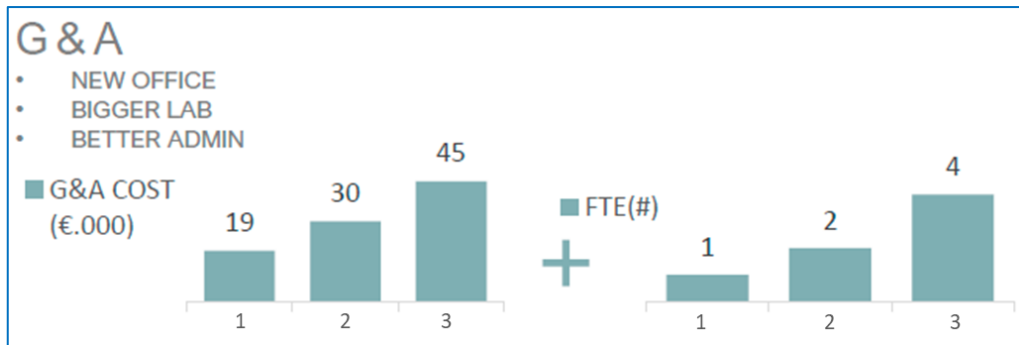
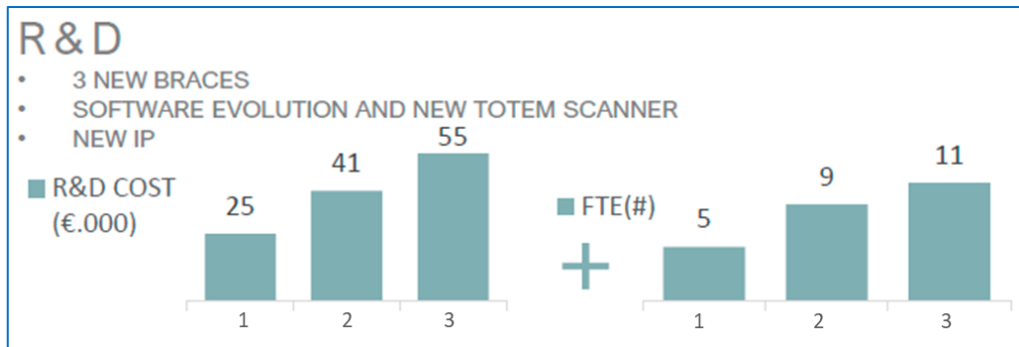


Source 5: Holey Corporate Overview

Regarding costs, there are three macro cost areas to take into consideration and which have the greatest impact on the finances of the start-up. Each cost is justified by the objectives to be achieved. Holey's team imagined its costs as pictured below:

Figure 13: Cost Details





Source: Holey Corporate Overview

3.2.4 Business scalability

Scalability, a fundamental element in the definition of start-ups, is fully in this type of reality, in fact, only initially the Holey project will focus on the Italian market, but it represents an easily replicable and scalable business, both from a technical point of view and from the point of view of the market and therefore of the business model.

The scalability, from a technical point of view, will depend on the initial choices made in terms of software architecture and / or hardware architecture. Technically, Holey will have to increase its performance in terms of physical resources (eg hardware, servers, etc.) in the face of a growth in the user and customer base, according to needs and availability. Furthermore, it will be necessary to develop the multilingual version according to the target countries.

The supply according to the loan for use that does not allow the start-up to have total control of the supply chain, once they have entered the market and reached a certain level of technology and product scalability, it will be possible to evaluate the option to change the price applied. to clinics making it more profitable.

Furthermore, the software, developed internally, is designed to be easy and intuitive to use. It can therefore be used by anyone with even very little experience in the 3D medical field. Having automated the entire brace creation process, the creation process is easy, fast and scalable. In addition, it is able to modify the 3D model of the brace, to allow the medical staff to meet the clinical and personal needs of the patient, and can be updated with various types of braces for different anatomical segments.

3.3 Business Plan

In view of the considerations made previously, the start-up manifests, in order to grow and develop its business, a financial requirement between € 350,000 and € 400,000.

The resources would cover expenses according to the following percentages:

- 25% marketing
- 15% hardware
- 12% G&A
- 50% human resources

The way-outs identified by the Holey Team for the exit of the hypothetical co-investor generally concern the following hypotheses:

- entry of new financial or "industrial" partners
- sale of all the shares to new investors
- possible sale of the whole company to important industrial companies and leaders in the market
- in the alternative, any repurchase of the shares by the current shareholders

The following tables summarize the prospective economic-financial plan published by Holey:

Table 16: Income Statement

	1	%	2	%	3	%
Revenues	138.980	100%	653.100	100%	1.746.100	100%
CoGs	(53.440)	38%	(222.950)	34%	(383.150)	22%
Gross Profit	85.540	62%	430.150	66%	1.362.950	78%
G&A	(24.450)	18%	(95.400)	15%	(185.483)	11%
S&M (Marketing)	(38.300)	28%	(118.780)	18%	(278.800)	16%
R&D	(64.000)	46%	(259.667)	40%	(454.917)	26%
EBITDA	(41.210)	-30%	(43.697)	-7%	443.750	25%
Depreciation-Amortization	(15.667)	11%	(61.000)	9%	(240.000)	14%
EBIT	(56.877)	-41%	(104.697)	-16%	203.750	12%

Source: Business Plan Holey3D Mar19

Below are the prospective operating cash flows presented by Holey, which express, in all the years of the plan, a growing requirement, but are not commented on in detail:

Table 17: FCF

OPERATING CASH FLOW (in Euro)	2019	2020	2021
Cash inflow	126.280	527.060	1.463.740
Cash outflow	(188.050)	(857.060)	(1.958.150)
Total operating cash flow	(61.770)	(330.000)	(494.410)

Source: Business Plan Holey3D Mar19

3.4 Sensitivity analysis

In addition to what is present in the commercial and financial publications of the start-up object of this study, it is appropriate to make an assessment of a different scenario from the one proposed by Team Holey.

In particular, the revisions that can be made concern:

- The Revenues: the development of the turnover is linked to the agreements with the healthcare structures. Holey expects a progression in revenues of approximately 370% in 2020 and approximately 167% in 2021, starting from a 2019 figure of € 138,980 (which, according to what has been learned, is currently achieved for € 60,000 thanks to the agreement signed with INAIL). In this regard, it was considered appropriate to make the following corrections and additions:
 - I. for the Healthcare Information and Technology sector - considered similar to Holey's area of activity - a growth rate of 12.28% is expected for the years 2020-2021 (source: Damodaran). It was considered correct to foresee a growth in Holey's revenues in 2020 equal, in percentage terms, to double the aforementioned value (24.56%) - also assessed the 2019 performances to date; for 2021, in order to further appreciate the possible speed of business development for Holey linked to significant product innovation, growth equal to three times (36.84%) compared to the 2020 figure was estimated.
 - II. Revenues from platform maintenance fees (€ 1,200 / year / unit) not included in the economic plan published by Holey, but defined in the agreements with the structures, were entered with the same progression of growth sub 1).

As a result, revenues are changed as follows:

Table 18: Revenues Rectified

Importi in euro	1	2	3
Revenues Holey rectified	138.980	173.113	236.854
Revenues platform maintenance fees (integration)	18.000	22.421	30.676
Total	156.980	195.534	267.530

Source: Business Plan Holey3D Mar19, own calculation

Assuming, therefore, that the Revenues and consequently also the Cost of goods sold will grow at a percentage of 24.56% for the first year and 36.84% for the second year, the adjusted Income Statement is:

Table 19: Income Statement

Importi in euro	2019	%	2020	%	2021	%
Revenues	156.980	100%	195.534	100%	267.569	100%
CoGs (costo del venduto)	(53.440)	34%	(66.565)	34%	(91.087)	34%
Gross Profit	103.540	66%	128.969	66%	176.482	66%
G&A (costi generali)	(24.450)	16%	(95.400)	49%	(185.483)	69%
S&M (Marketing)	(38.300)	24%	(118.780)	61%	(278.800)	104%
R&D (Ricerca e sviluppo)	(64.000)	41%	(259.667)	133%	(454.917)	170%
EBITDA	(23.210)	-15%	(344.878)	-176%	(742.718)	-278%
Depreciation-Amortization	(15.667)	10%	(61.000)	31%	(240.000)	90%
EBIT	(38.877)	-25%	(405.878)	-208%	(982.718)	-367%

Source: Business Plan Holey3D Mar19, own calculation

Note that the Ebitda is negative in all years of the plan. In the forecast income statement prepared by Holey, the EBITDA assumed a positive consistency in the third year of the plan.

Another element of weakness and lack of costs is in the definition of the remuneration that will be recognized to the intermediary / dealer. Since it was not quantified, it was not possible to include it among the adjustments of Holey's economic plan. I would also like to point out that, in my opinion, there would be no insurance in the costs to cover any delays and problems related to logistical issues or damage during transport. But its quantification is not easy.

Before moving on to the evaluation of the value of the Start-up, we must calculate the Weighted Average Cost of Capital, WACC, which represents the average cost of capital that the company pays to all its investors, shareholders and creditors (S. Ozerturk, 2009)⁴⁹.

⁴⁹ S. Ozerturk, *Cost of Capital (WACC: Weighted Average Cost of Capital)*, ECO 4368, 2009 - <http://faculty.smu.edu/ozerturk/pdf4368/4368-note11.pdf>

Table 20: WACC

Costo del capitale di rischio (ke)	
Risk free rate before tax	2,80%
Beta unlevered	0,91 fonte Damodaran
D/E	0,13 fonte Damodaran
Beta relevered	0,0000 fonte Damodaran
Tax rate	27,00% fonte Damodaran
Country Risk Premium	2,63% fonte Damodaran
Equity Risk Premium	5,00% fonte Damodaran
Ke	2,80%

Costo dei debiti finanziari (Kd)	
Kd before tax	5,00%
Kd Tax rate	27,0%
Kd after tax	3,65%

Struttura Finanziaria	
Peso del capitale di rischio E/(D+E)	88,63%
Peso del capitale di debito D/(D+E)	11,37%

WACC	
WACC	2,90%

Peso del capitale di rischio E/(D+E)	88,63%
Peso del capitale di debito D/(D+E)	11,37%

Source 6: own calculation

Kd = Cost of debt capital that is the interest rate of third party capital (Eg. Interest rate applied by the bank on a loan or credit line). Where possible, it must also take into account the evolution of the interest rates as a function of future management choices and endogenous events related to the economic system.

Ke = Cost of equity calculated using the CAPM⁵⁰ rule

D% = Percentage of debt calculated on the basis of the capital present in the company.

E% = Percentage of equity calculated on the basis of the capital present in the company.

Tax Rate = Percentage of incidence of corporate IRES and IRAP taxes

Risk Free Rate = Calculated on the basis of the bond yield deemed risk-free, the yield of a ten-year BTP of the state in which the start-up is located or in which it has major activities in progress is usually used. In the case of an Italian start-up, the returns of a 10-year BTP will be taken into consideration⁵¹.

⁵⁰ CAPM, Capital asset pricing model, estimates the risk in terms of the variability of corporate returns with respect to those of the stock market $i_2 = B (R_m - i_1)$, where i_2 stands for the risk premium factor, B stands for Beta factor, and R_m stands for return stock market average. In the CAPM, the total business risk can be split into a component that can be eliminated through a process of investment diversification (specific component) and another macroeconomic component, the latter that cannot be diversified (structural or systemic component). The Beta factor quantifies the latter through the relationship between the covariance between the returns of the company to be assessed and the returns of the entire stock portfolio of the market and the variance of market returns (A. Damorodan) 200. In order to complete and integrate the Beta factor theme, the Hamada201 formula allows to correct the sector beta in the event of dissonance between the financial risk, understood as the degree of indebtedness, between the rated company and the sector average. This formula consists of a separation of the financial component from the levered Beta (sector Beta), through the deduction of the market value of the leverage of the sample in order to find an Unlevered beta which, through a relevering operation, will exclusively incorporate the financial risk linked to the its debt position. Furthermore, we can affirm that empirical researches carried out have shown that the application of the CAPM leads to an underestimation of the risk of small / medium-sized enterprises, which also include start-ups, in fact using this model it is not possible to intercept the additional risk typical of these companies.

⁵¹ www.it.investing.com

Unlevered Beta = Expression of the non-diversifiable systematic risk of companies. A useful document on which the main evaluations that make use of Beta unlevered are based is the one published following the studies of Prof. A. Damodaran⁵².

Market Risk premium = is the average return of the stock market of the reference country taken from the studies made by Prof. Damodoran in January 2017⁵³.

We can now take stock and evaluate our start-up both on the basis of the economic-financial plan drawn up by the shareholders and on our adjusted plan. We will specifically use 2 methods: Cash Flows and Multiples.

During the evaluation, we assumed to be at the conventional reference date equal to 1/1 of the first starting year of the prospective plan.

It was not possible to apply the DCF method given the negative cash flows in the short to medium term resulting from both the plan presented by the Proponent and an adjusted plan.

For the multiples of Turnover and EBITDA, stock market data collected in Europe were used, relating to a sample of about 77 companies in the Healthcare Information and Technology sector, which by methodologies and market is the most consistent with the activities carried out by Holey.

The multiples used result from the application of the median to the sample analyzed, respectively referring to both turnover and EBITDA. The application of the multiples method involves the use of multiples of the EV, therefore without taking into account the actual financial structure of the target company, which intervenes downstream only when the target EV is transformed into the target Equity Value / adding (depending on whether it is negative or positive respectively) the NFP from the gross value resulting from the application of the multiple to the respective economic reference quantity.

⁵² www.pages.stern.nyu.edu

⁵³ www.pages.stern.nyu.edu

MULTIPLE METHOD (on rectified statement)

(EV/EBITDA)

EV/EBITDA*	17,05
Average EBITDA	FINAL VALUE
- 393.969	- 6.717.173

Ebitda			
1	2	3	Media
(41.210)	(367.298)	(773.399)	(393.969)

(EV/Fatturato)

EV/Sales *	3,59
Average Revenue	FINAL VALUE
182.994	656.948

Revenue			
1	2	3	Media
138.980	173.113	236.888	182.994

MULTIPLE METHOD (on original statement)

(EV/EBITDA)

EV/EBITDA*	17,05
Average EBITDA	FINAL VALUE
119.614	2.039.424

Ebitda			
1	2	3	Media
(41.210)	(43.697)	443.750	119.614

(EV/Revenue)

EV/Sales *	3,59
Average Revenue	FINAL VALUE
846.060	3.037.355

Revenue			
1	2	3	Media
138.980	653.100	1.746.100	846.060

* (Source Damodaran Healthcare Information and Technology Sector)

V.C. METHOD (on rectified statement)

FCF (exit)	- 773.399
investment duration	3
P/E*	28,79
Discount Rate	2,90%
Final Value	- 20.438.148

* (Source Damodaran Healthcare Information and Technology Sector)

V.C. METHOD (on original statement)

FCF (exit)	443.750
investment duration	3
P/E*	28,79
Discount Rate	2,90%
Final Value	11.726.715

* (Source Damodaran Healthcare Information and Technology Sector)

After the qualitative and quantitative assessments, we can conclude that the idea of a 3D printed brace has considerable potential. The positive aspects of the project are essentially linked to:

- Team: the Holey team combines high-level technical skills, entrepreneurial skills and passion
- Product Innovation: this is an innovative idea in its application and exploitation but not in its basic production technique. This allows for a judgment of stability and reliability in relation to the technology

However, the market has entry limits that are not easy to overcome. The following are the key elements:

- The impossibility of patenting the software
- Only partial capacity to replace traditional systems
- Low speed project
- CE mark not required which could consequently present scepticism, also in terms of responsibility on the part of NHS operators
- Manipulation in the application phases of the cast is not possible in cases where you decide to wear a Holey brace
- Cannot be used in emergencies / First Aid given the required printing times between 4 and 6 hours
- Brace currently available for upper limb only
- A strong and captivating commercial strategy is required

To date, the main limitation found is related to market penetration. The difficulty, as with all process and tool innovations, lies in providing education to both the end user - patient and client - public / private clinics. To overcome this non-negligible barrier to entry, putting in place best practices that can be convincing for more and more healthcare facilities can be an idea. And this is what they are feeling with INAIL. Furthermore, it is well understood that the reference market is above all that of private structures and the team's preferred commercial business model is that of the Loan for use with printing by Holey.

Conclusions

The paper started from the analysis of the characteristic components of a start-up, such as definition, financial, structural and organizational characteristics. The phases of the life cycle were then described and the subjects in charge of supporting it were identified and then moved on to highlight the impact of the same on the economic context, also understood as the link on the dynamics of technological advancement and employment. Our analysis then concentrated on the existing evaluation methods in terms of start-ups, traditional or alternative, the defects of each were highlighted and the peculiarities of a start-up were specified from an evaluation point of view.

The difficulty of analysis in the investment of a start-up is known. Furthermore, few of these companies are able to create real value that turns into dividends or Capital Gain able to recover the investment and create a margin. Many of these investments result in a start-up closure or in the sale of shares that are often not sufficient to guarantee a zero-sum or positive game on the investments previously made. Not surprisingly, incubators try to create portfolios such that successful investments can cover the losses of "bad business" with the gains from successful ideas. From an accounting point of view, however, an issue of valuation by competence of these expected losses emerges. Furthermore, it is highlighted that it is not possible to impute the losses of investments in non-profitable start-ups only when the loss-making exit or the closure of the companies occurs. The principles of prudence and competence require the recognition of such permanent losses in value in the financial statements in which they are ascertained to be brought forward.

To this end, the management will have to implement an evaluation policy for its start-ups registered among the assets. As we have seen, financial valuation techniques, in this context, often appear to be difficult to use, as the verification of the assumptions present in the business plan are linked to highly uncertain trends and events.

However, management is often obliged to demonstrate the resilience of the values of its assets since, in the life cycle of start-ups during the first years there is an erosion of the net assets and of the non-repayable finance with conversion of these loans into share capital (convertible). The difficulty of finding a criterion for identifying the value, and for evaluating it, of the company in the period from the Seed phase to the next Round, makes it necessary to move to qualitative or market methods.

It is clear that these methods must be correctly used and formalized by the investing company. Furthermore, they must not be created with the aim of identifying a future investment value, but with the aim of supporting at least the costs incurred by the investor.

Regarding the case study analyzed in the third chapter, what we can conclude is that the idea of a 3D printed tutor has considerable potential. The positive aspects of the project are essentially linked to:

- ✓ Team: the Holey team combines high-level technical skills, entrepreneurial skills and passion;
- ✓ Product Innovation: this is an innovative idea in its application and exploitation but not in its basic production technique. This allows for a judgment of stability and reliability in relation to the technology.

The market has entry limits that are not easy to overcome. The following are the key elements:

- ✓ The impossibility of patenting the software
- ✓ Capacity, only partial, to replace traditional systems
- ✓ Low speed project
- ✓ CE mark not required which could consequently present skepticism, also in terms of responsibility on the part of NHS operators
- ✓ Manipulation in the application phases of the plaster cast not possible in cases where you decide to wear a Holey brace
- ✓ Cannot be used in emergencies / First Aid given the required printing times between 4 and 6 hours
- ✓ Brace currently available for upper limb only
- ✓ Weak trading strategy

To date, the main limitation found is related to market penetration. The difficulty, as with all process and tool innovations, lies in providing education to both the end user - patient and client - public / private clinics. Creating a good business strategy with a network of potential customers and putting in place best practices that can be convincing for more and more healthcare facilities may be the right choice to overcome the limit of entry barriers. In addition, the business model should be aimed mainly at private structures and opt only for commercial agreements on loan for use.

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