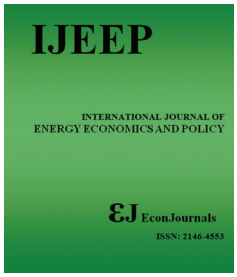

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Energy Innovative Start-ups and Knowledge-based Strategies: The Italian Case

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ABSTRACT

The purpose of this paper is to analyze the energy innovative start-ups currently existing in Italy. An investigation on whether those firms are able to implement a knowledge-based strategy (KS) is described: In particular, it is a strategy based on a high investment in qualified human resources and, in general, this is reflected in the fact that the company adopting a KS pays its employees more than the average of other companies belonging to the same sector. Furthermore the ability to generate a return on the investment in knowledge is analyzed. A methodology already proposed in other papers by the same authors was applied in order to identify firms that adopt a KS understanding also the sustainability of such kind of strategy. A discussion on how firms that do not implement a profitable KS can improve and consolidate their position in terms of knowledge is proposed.

Keywords: Energy Innovative Start-ups, Knowledge-based Strategy, Human Capital Efficiency, Value Creation
JEL Classifications: M13, M20, M41, O32, O34

1. INTRODUCTION

The issue of energy has assumed a greater relevance during last decades. Historically, energy has been a fundamental factor for economic development, starting from the use of fire that allowed the cooking and preservation of food and protection from the cold winter, up to the Industrial Revolution of the nineteenth century, the diffusion of air transport and new plant solutions (Kühtz, 2005).

Towards the end of the 1960s and the beginning of the 1970s, the idea of a sustainable development matures in every field, first of all in energy (Finnegan et al., 2018). It is very important to protect the environment from the disproportionate use of resources, the excessive and uncontrolled modification of the surrounding nature (Senatore, 2013; Giannone, 1975): So, there is the necessity to induce a revision of the traditional development model based on constant technological development and an ever-increasing production (Marchisio et al., 1998).

The idea that innovation is a key factor for sustainability is widely accepted by scholars, industry professionals and government representatives: It is due to the fact that sustainable development requires an immediate action and changes from governments, industry and the whole society (Silvestre and Ţîrcă, 2018).

In fact, the sustainable energy is a field that goes strictly together with the innovation; within the innovative start-ups there is the join of the two fields.

In 2012 the Italian legal system introduces the definition (Sileo et al., 2018) of "innovative start-up with high technological content." It is a new company whose social purpose is the production of innovative products or services with a high technological value (Iacobucci et al., 2014). Each year in Italy energy innovative start-ups grow up: Their trademark is a clean, sustainable energy.

The aim of this paper is to study the energy innovative start-ups and to evaluate the attitude to invest in knowledge and the ability to generate

a return on this investment. Specifically, a methodology will be applied to distinguish companies that adopt a knowledge-based strategy (KS) that can create value for stakeholders, already proposed in other works (Iazzolino and Laise, 2013; 2018; Iazzolino et al., 2017).

On the other hand, it's interesting to observe that these start-ups belong exclusively to the industrial sector of Research and Development (R&D). Hence, these start-ups are analyzed using a knowledge management approach: As the ISTAT (Italian Statistic Institute) report (published on February 22, 2018) on the creation of knowledge and R&D affirms, today the main vehicle for the creation of knowledge is represented by R&D.

The creation of knowledge and therefore the development of a KS cannot ignore the role played by innovation (Alavi and Leidner 2001); therefore a typical characteristic of a KS can only be given by high investments in R&D. Moreover, there are many empirical studies that support this thesis: In fact, according to them, the stock of local knowledge is often approximated with the expenditure invested in R&D (Audretsch and Keilbach, 2007; Acs et al., 2009).

Then, it's unique that the R&D activity is related only to startups operating in the energy field while other types of innovative start-ups belong to other industrial sectors. So, a strategy based on knowledge would be better pursued by the innovative startups that operate in the energy sector and not by the other innovative start-ups.

Consequently, knowledge turns out to be a perfect glue between sustainable energy and technological innovation, both distinctive features of an innovative start-up that operate in the energy field.

The paper is organized as follows: In section 2, the literature review is described; in section 3, the methodology applied is analyzed; in section 4 the authors describe the sample of start-ups to be used in the empirical analysis; in section 5 and section 6 the results obtained and the discussion are included. Section 7 describes conclusions, implications and further research.

2. LITERATURE REVIEW

The literature review is divided in two sections that are the two main fields of interest of the paper: (1) Innovative start-ups and (2) knowledge-based strategies and sustainability.

2.1. Innovative Start-ups

Researches on innovative start-ups are very recent: In fact, they are "new" start-ups, that is start-ups born about 5 years ago.

Paik and Woo (2013) examined how fluctuations in the amount of capital flowing into venture funds affect the financing of innovative startup companies and how economic downturns affect such financing.

The process of creating an innovative start-up (just in the early stage phase) can be studied analyzing the link between the distinctive traits of entrepreneurs and the emerging profiles of new companies (Onetti et al., 2015).

Söderblom and Samuelsson (2014) underlined how innovative start-ups play a vital role in order to stimulate an economic growth, increase productivity and contribute to the competitiveness at the national level.

Carpita (2015) carried out a statistical analysis that shows a clear relationship between the diffusion of innovative start-ups in a specific region and some indicators of BES - Fair and Sustainable Wellness[1].

The last edition of the "Innov-e Observatory Report" published by the I-COM - Italian Competitiveness Institute (Sileo et al., 2018), continues with the research activity on energy innovation launched 10 years ago. Specifically, the last chapter of this Report talks about innovative start-ups, especially innovative start-ups that operate in the energy sector. They are analyzed in different aspects: Historical evolution of innovative start-ups and the relative growth rate by geographical area, regional and provincial distribution, distribution in terms of industrial sector of activity and of class of employees, capital and production, patent activity and demographic dynamics.

Colombelli and Quatraro (2017) analyzed the innovative start-ups more specifically according to the contribution of knowledge that they are able to offer locally, more precisely at the level of Italian NUTS3 regionss[2].

In particular, they defined a mapping of the distribution of innovative start-ups in the energy field: This is a very current debate with the so-called "green Start-ups," as defined by Colombelli and Quatraro (2017), that is to say with start-ups characterized by a green economy.

Specifically, it's an economy that develops in the shadow of the economic crisis of 2008 and that focuses on a win-win situation, where the economy and the environment triumph together (Garbasso, 2014). The generation, the adoption and the diffusion of "green technologies" are currently considered the key factors to recover the competitiveness of the advanced countries that the economic crisis had compromised (Gilli et al., 2014; Costantini et al., 2013; Cainelli et al., 2013; Ghisetti and Quatraro 2013; Mazzanti and Zoboli 2009): Their emerging importance consists in believing in their ability to create new jobs and to introduce new perspectives for economic growth (Crespi et al., 2015).

2.2. Knowledge-based Strategies and Sustainability

In 2000, the Lisbon Conference, the European Council adopted the strategic objective of focusing on the "most competitive and dynamic knowledge-based economy in the world, capable of achieving sustainable economic growth with new and better jobs and greater social cohesion."

1 Fair and sustainable welfare (BES) is an index, developed by ISTAT, to assess the progress of a company not only from an economic, but also a social and environmental point of view: the 12 dimensions considered for the measurement of this index in fact range from those of the "monetary" type to those related to the field of health, education, work, environmental protection, etc.

2 Colombellis and Quatraro (2017) analyzed 3712 start-ups included in the "innovative start-ups" online directory that had registered at the Italian Chamber of Commerce between 2009 and 2015 in 103 Italian NUTS3 regions. In particular, in Italy NUTS 3 regions correspond to administrative units (provinces) that group together different neighboring municipalities (Colombelli and Quatraro, 2017).

In short, knowledge and sustainability were already considered two elements that have to go hand in hand in a business strategy: Sustainability with the use of knowledge is guaranteed because knowledge is a non-rival asset that can be used simultaneously by several companies without reductions in the enjoyment of the goods by anyone (Parello, 2010). According to Sveiby (2001), knowledge is the only resource that doesn't lose value, but rather increases with its use: Consequently, it allows to implement a strategy able to directly convert an input (knowledge) into value, (Guthrie and Ricceri, 2012) a therefore sustainable strategy, which therefore supports, supports the objectives of the present without compromising those of the future.

Today, a strategy based on investment in knowledge workers is the greatest competitive weapon of the companies; furthermore, it is a kind of strategy that can lead to a sustainable advantage (Grant, 2010). By sustainable growth strategies we generally mean the firm behaviors that in the long run tend to legitimize the social, environmental and economic expectations of all stakeholders, both internal and external (Donaldson and Preston 1995; Drucker 1999b).

The necessary condition to create wealth for all stakeholders is, according to Drucker, the growth in productivity of knowledge workers. An author who accepts the challenge of measuring the productivity of knowledge workers is A. Pulic (2000; 2004; 2008). Other works by the same authors of this paper have extended and enriched this theory (Iazzolino and Laise, 2013; 2018; Iazzolino et al., 2017).

Companies that adopt a KS can be analyzed, from an accounting point of view, by using some specific indicators like the VA - Value Added (Iazzolino and Laise 2013; 2018; Iazzolino et al., 2017). Only the human component is able to create new knowledge and consequently produce a value added (VA) that justifies the investment in human capital (HC). Knowledge that creates value is incorporated into people. It can be identified as "living knowledge," different from the "dead knowledge" that is embedded in machines (Iazzolino and Laise, 2018).

Therefore, a strategy in which knowledge plays a fundamental role, can only be a strategy in which we invest in human resources heavily, seen as the only real agent of the business (Sveiby 2001).

3. RESEARCH METHODOLOGY AND AIM OF RESEARCH

The research methodology aims to identify companies that adopt a KS and that are also able to create value for all stakeholders (shareholders and employees).

The broader aim of the research is to identify companies that are sustainable in an "integral" form, that's to say sustainable as regards all three dimensions of sustainability (economic, social and environmental dimension). Through the methodology described in this paper, companies identified are those that implement a KS and that create value for stakeholders (dimensions of social and economic sustainability). Moreover, these companies apply a type of energy that is sustainable as operating in the field of renewable and/or energy efficiency (so, implicitly they satisfy the environmental dimension of sustainability): Therefore, we can say that companies identified are sustainable from all points of view.

The methodology applied builds on Drucker (1968; 1993; 1999a; 1999b), Pulic (2000; 2004; 2008) and other works by the same authors of these papers. For a detailed description of the theoretical basis of the methodology used in this paper, see Iazzolino and Laise (2013; 2018) and Iazzolino et al. (2017).

The analysis is based on data that can be gathered from the value added income statement whose simplified form is reported in the following Table 1.

He suggests measuring the productivity of the knowledge worker by means of the notion of economic efficiency defined as:

$$\text{Economic productivity} = \frac{\text{Value Added(VA) from investment in Human Capital}}{\text{Investment in Human Capital(HC)}}$$

That is, more concisely:

$$HCE = \frac{VA}{HC}$$

Where:
HCE = HC Efficiency;
VA = HC+EBITDA; and
HC = Human capital, i.e., cost of employees (salaries and wages).

A KS is based on a high investment in qualified human capital (Iazzolino et al., 2018), so with a high level of competence and training. When investing in human resources, trust is placed in "living knowledge," which is incorporated in the employees, that is, in people. It is believed that only human beings are able to create new knowledge and, therefore, produces VA in such a way to justify investment. Moreover, only highly trained human resources are able to increase the quality and quantity of intangible assets (organizational relations and relations with customers). This characteristic reflects that the company, which invests in knowledge and so adopts a KS, pays its employees more than the average.

Furthermore, applying a good "KS" means repaying the high investment in skilled human resources through the achievement of a high "knowledge productivity." Using technical terms, such productivity can be defined as the "human capital efficiency (HCE)": If a strategy based on knowledge assumes a value of HCE higher than the value achieved by its competitors, it can create

Table 1: "Value added" income statement

Sales
- External costs
= VA (value added)
- HC (human capital - salary and wages)
= EBITDA
- Depreciation and amortization
= EBIT

Table 2: Conditions applied

Condition		Characteristics	Notes
1	Knowledge-based strategy (KS)	• $(HC/\#Empl.)_j > (HC/\#Empl.)_{a.i.}$	Investment in human capital higher than average
2	Knowledge-based strategy (KS) creating value for all stakeholders	• $(HC/\#Empl.)_j > (HC/\#Empl.)_{a.i.}$ and • $(VA/HC)_j > (VA/HC)_{a.i.}$	Investment in human capital and knowledge productivity higher than average

value for employees, that's to say not only for shareholders but also for internal stakeholders.

Therefore, a KS that creates value for all stakeholders is characterized by (1) a high level of investment in human resources and (2) a high level of knowledge productivity:

1. $(HC/\#Empl.)j>(HC/\#Empl.)_{a.\ i.}$ and
2. $(VA/HC)_j>(VA/HC)_{a.i.}$

Where:

- #Empl. = number of employees;
- VA = HC + EBITDA;
- j = index of the start-up;
- a.i. = average industry.

In particular, the first inequality compares companies in terms of average cost of the employees; instead, the second evaluates the productivity of a company through the value added, that's to say it interprets the productivity of a "knowledge worker," so the HCE, as the added value generated by a company compared to the value of investment in human capital (HC), cost per employee in this case.

So, from this point of view, the KS turns out to be an economically and socially sustainable strategy since it is a "win-win" strategy, that's to say, it generates VA for all stakeholders (employees and shareholders). This is the great capacity of a KS: Being able to bring value to all stakeholders, both economic (as the company is repaid of its investment in knowledge) and social (as the human component is not exploited but respected with an adequate remuneration compared to the work performed).

The following Table 2 shows the two conditions that will be applied.

In particular, the system of Cartesian axes will be used; according to the following Figure 1, the sample of start-ups will be placed: In essence, there will be 4 clusters of companies on the basis of their ability to respond to one, to either or none of the requirements of the methodology discussed above.

The origin of axes is the average value of the terms (HC/# Empl.) and (VA/HC), that is $(HC/\#Empl.)_{a.i.}$ and $(VA/HC)_{a.i.}$ The acronym "a.i." stands for average industry.

4. SAMPLE

The list of innovative start-ups was downloaded from the special section of the Italian "Register of Companies;" then, through an appropriate filter, we have extracted the entire database (updated to August 13, 2018) of innovative startups in the energy field.

Precisely, for the empirical analysis we haven't used the entire sub-sample of energy innovative start-ups (a total of 940 start-ups)

Figure 1: Clustering of start-ups

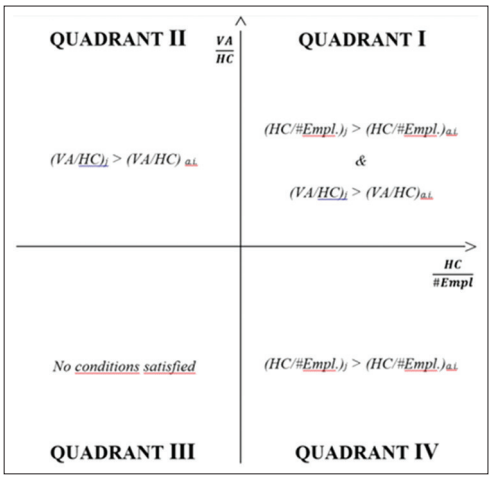
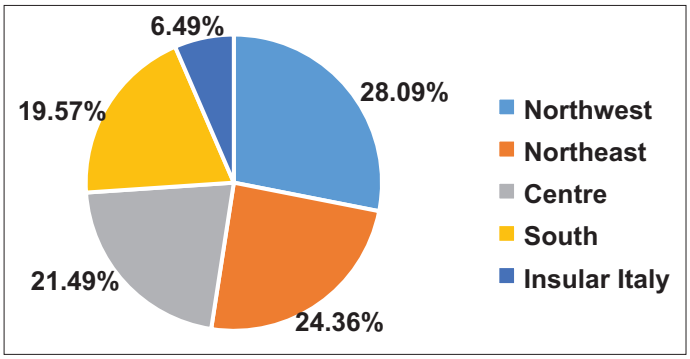


Figure 2: Distribution of start-ups (%) per geographical class



but some skimmings have been made. First of all, it was decided to consider only those companies having ATECO code 721909 "Experimental R&D in the field of other natural sciences and engineering" as it covers the majority, around 76%, of the entire sample of this type of innovative start-up.

Analyzing this subset of start-ups from a geographical point of view, the presence in the North (about 53%) is higher than the rest of Italy: At first, according to the European classification NUTS - Nomenclature of territorial units for statistics, the North-West stands out, certainly favored by the high number of start-ups residing only in Lombardy; then, we have the North-East, the Center and the South of Italy; finally, there are the Islands, Sicily and Sardinia (Figure 2).

Data for applying the research methodology were extracted from the AMADEUS database (ORBIS Europe) Bureau van Dijk: Hence, considering the unavailability of some data that are necessary to apply the conditions of the framework (Table 1), there was the necessity to skim the number of start-ups to be considered from 940 to 275.

In particular, this sample of 275 start-ups belongs to those born respectively in the years 2013 to 2017: Therefore, as the innovative start-up was introduced in Italy in 2012, companies that started their activities in 2012 and 2018 were practically excluded.

Below there are three distinct figures that describe the 275 start-ups respectively in terms of:
- Distribution by year of starting activity (Figure 3);
- Distribution by number of employees (Figure 4);
- Distribution by cost of employees (Figure 5).

The choice to analyze the sample by number and cost of employees is due to the characteristics of the research methodology seen in the previous paragraph: In particular, if dimension in terms of number of employees is a fairly critical element (Figure 4 shows a clear prevalence of start-ups in class A which detects a maximum number of employees equal to 2), the expenditure incurred for employees is distributed more homogeneously among the 275 start-ups.

The 275 start-ups analyzed can be found in Annex 1; in particular, these values are reported:
- Number of employees (#Empl.);
- Cost of employees th USD (HC);
- EBITDA th USD;
- Value added th USD (VA).

5. RESULTS

Once the sample of data was established, the real empirical analysis was carried out. In particular, in order to carefully evaluate the situation of each start-up related to the average cost per employee ("HC/#Empl.") and to the value creation ("VA/HC"), it was worth considering the "pure" values that serve to verify the conditions 1 and 2 observed in Table 2 ("Empl.", "HC" and "EBITDA") as an average on the number of years of existence of start-ups. This choice may not be very correct because the year of existence for each company is different, but the majority of sample is composed of start-ups that start to exercise their activity in the first 3 years of the range considered (from Figure 3, on the other hand, it can be seen that these three periods cover about 73%, therefore more than half of the sample considered): So, for each start-up we calculated, where possible, the average values of those "pure" data in order to avoid that the results could be linked to particular years.

The results obtained from this empirical analysis are illustrated in Figure 6 which takes up the figure proposed previously (Figure 1); however, on the basis of the results obtained, a Cartesian diagram

Figure 3: Distribution of start-ups by year of starting activity

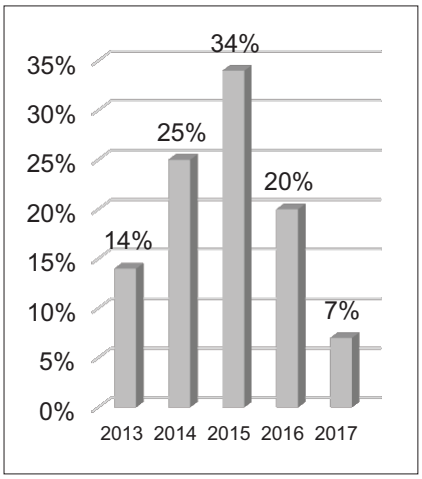


Figure 4: Distribution of start-ups by number of employees

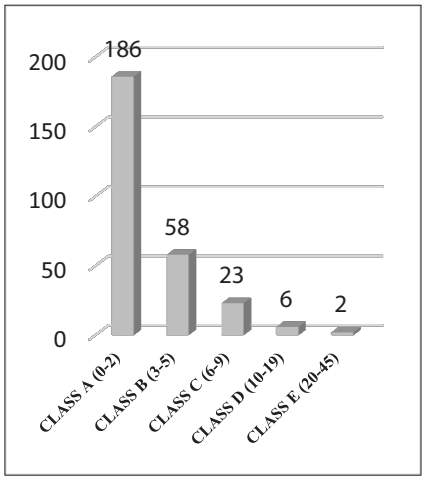


Figure 5: Distribution of start-ups by cost of employees

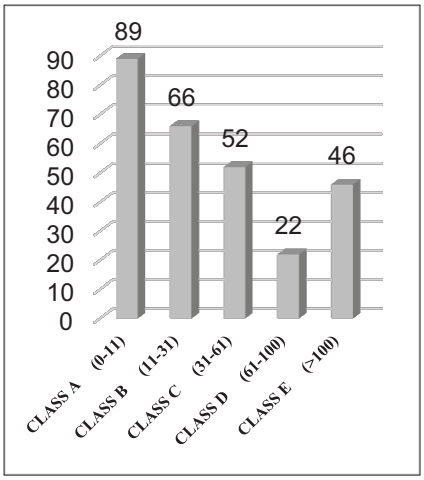
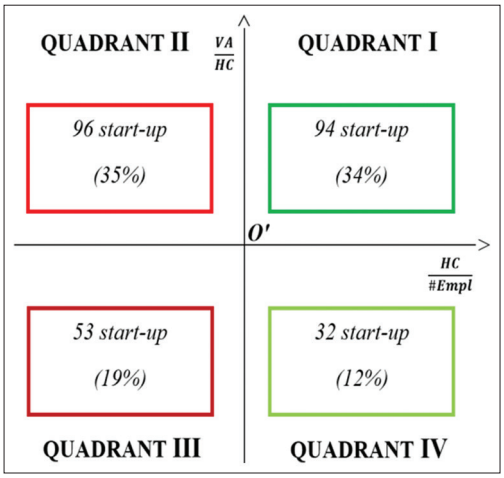


Figure 6: Numerical and percentage distribution of start-ups



was constructed, considering as main axes those derived from the averages (HC/#Empl.)a.i. and (VA/HC)a.i., both calculated on the whole sample. Basically, from a Cartesian system Oxy with the origin O (0; 0) we have passed to a new Cartesian system O'xy with the origin O' (16.17, 0.79): 16.17 and 0.79 are the respective numerical values of the terms "(HC/#Empl.)a.i." and "(VA/HC)a.i."

So, there are 4 quadrants (just as shown in Figure 1): In the first quadrant (Quadrant I) there are positioned the start-ups that apply an effective KS (that is with an investment in human capital and with a knowledge productivity higher than average); then, continuing in a clockwise direction, there are start-ups with only the value of "HC/#Empl." higher than average, then those that don't invest in human resources and don't achieve a high level of efficiency of human capital (HCE); finally, we have start-ups with exclusively the value of "VA/HC" higher than average.

The following Figure 6 shows the distribution of the start-ups in the different quadrants in terms of numbers and percentages.

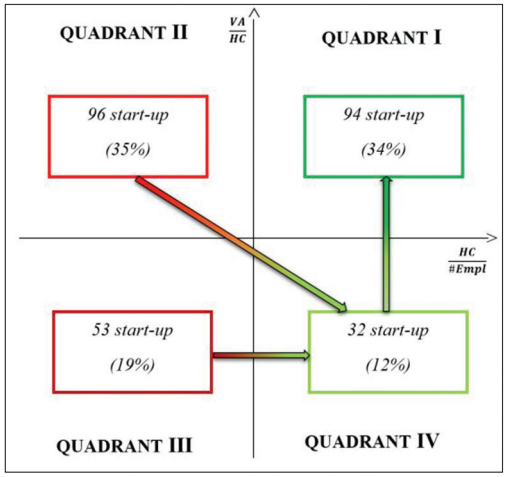
6. DISCUSSION

The results described above show a clear prevalence of start-ups that don't apply a KS able to bring value to all stakeholders (66% against the remaining 34%). However, this predominance should not be interpreted in a negative way; rather, it's necessary to analyze these results going beyond the simple distinction between startups that apply a KS or not. In particular, in order to better discuss the four different localizations of the analyzed sample (already observed in Figure 6), a specific scatterplot will be proposed for each quadrant.

So, each cluster of start-ups can be observed through both static and dynamic analysis: In fact, if on one hand the specific dispersion chart allows to view the precise positioning, therefore static and current, of each start-up, on the other, Figure 7 (and in particular with the use of the arrows in this figure) explains the path that a company should follow to reach the desired destination, that's to say the first quadrant.

The 94 start-ups positioned in the first quadrant (Quadrant I) of the diagram (Figure 7) have an average cost per employee and an

Figure 7: Ideal path to pursue for the start-ups



efficiency of human capital above the average. In the enlargement proposed in the figure (Figure 8a), we observe that most of the 94 start-ups are positioned in a range of values not very distant from the origin O'. However, the trend which all these companies assume is quite reasonable: In fact, there is an inverse proportionality between the values of the two axes, that is the tendency of the start-ups to move vertically (therefore to obtain a good knowledge productivity) with an investment in human capital not too far from the average value and a tendency to move horizontally (therefore to assume a moderate level of "HCE") with a higher investment in human resources.

The 32 start-ups of the Quadrant IV (Figure 8b) also invest in knowledge (high value of "HC/#Empl."); however, they cannot be classified as start-ups applying a "good" KS since the value created doesn't fully repay the high investment in human resources ("VA/HC" low).

These start-ups don't have a value of "VA/HC" higher than the average (equal to 0.79) because, although the value of "HC" is the same as that assumed from the 94 start-ups of the first quadrant, they have a negative value of "EBITDA": Therefore, the "VA" and consequently the "VA/HC" are low.

So, this second cluster is not so far from the 94 start-ups described above: In fact, knowledge is still considered the central heart of a business strategy (in fact almost all 32 start-ups have a value of "HC/#Empl." much higher than the average).

So, these 32 start-ups are not able to make their strong investment in knowledge from a purely structural point of view: Referring to the definition of pulic, the structural capital coincides with the EBITDA (Iazzolino and Laise 2013), which, although it stops to measure only the value created by the shareholders, contributes to the creation of value for a business strategy.

However, the starting point is good for these 32 start-ups since they base their strategy on a high value of "HC/#Empl.": Therefore, it is desirable that in the future these start-up will be able to produce a value that can fully represent, once and for all, the so-called HCE - human capital efficiency. So, as shown by the arrow in Figure 7 that goes to the first quadrant (Quadrant I), the 32 start-ups would be able to become companies in which knowledge is seen not only as a resource to be exploited for the pursuit of the "current purposes" but also as an asset to be preserved and maintained for future investments.

If in the right part of the diagram the situation is very positive, the same cannot be said for the one on the left. As regards the 53 start-ups of the Quadrant III (Figure 8c), none of the two inequalities of the first condition of the framework is satisfied: The average cost per employee is not sufficiently high; just as the knowledge productivity itself fails to be fully efficient.

In this case there is the necessity to start over: As indicated by the arrows in Figure 7, the road ahead consists of reaching first of all the quadrant alongside (Quadrant IV) and therefore promoting more and more the investment in human capital; after that, they have to go up a level (then go in the same direction of the 32 start-ups) in order to be able to implement a KS: Therefore a strategy

"Win-win," able to generate value (VA) for all the stakeholders, thus satisfying the economic objectives of the employees and the shareholders (Iazzolino et al., 2017).

From Figure 8c, it is evident that many of the 53 start-up have a value of "VA/HC" close to the average: Some of them are positioned in an area also close to average value of "HC/#Empl." and therefore it is conceivable to say that these start-ups are already restoring their strategy and therefore trying to follow that path described above that has as its destination the adoption of a KS.

Finally, in the last quadrant (Quadrant II) there are 96 start-ups characterized by a high value of "VA/HC" and a low value of "HC/#Empl." (Figure 8d): A behavior, therefore, diametrically opposite to the 32 start-ups of the Quadrant IV. Once again, both "HC" and "#Empl." values are similar to the values of the 94 start-ups of the first quadrant: Therefore, the real reason why these 96 companies do not pursue a KS should not be sought in the proper values of knowledge (in this case "HC" and "#Empl."). However, contrary to what happened to the 32 start-ups, the real reason cannot be attributed to the values of the term "EBITDA" (which in this case are not homogeneous): Instead, in this case, a relationship between "HC" and "#Empl." exists. More specifically, there is a direct proportionality between these values: If one increases, then the other also increases and vice versa.

At first glance, this is a situation not entirely unpleasant: On the basis of the positioning of the start-ups in the four quadrants (Figure 7), it would be sufficient that these 96 simply turned to the right increasing the value of "HC" and therefore becoming start-ups that apply a KS. However, this road actually turns out to be a short cut with no way out: The real problem lies in the very wrong starting point where a KS is to be based. In fact, the latter should always start with a high investment in qualified human capital and therefore with an average cost per employee ("HC/#Empl.") higher than the competitor companies belonging to the same sector of activity.

In fact, for the start-ups of the other quadrants, it is simply a matter of continuing to pursue the strategy adopted as winning (with the 94 start-ups) or to perfect the current strategy (quadrant with the 32 start-ups) or yet to start again with a new strategy that naturally culminates with a KS (quadrant with the 53 start-ups), on the other hand, for the 96 start-ups the situation is much more critical since they are at a point where they reach a high level of HCE (high value of "VA/HC"), a level that is not at all truthful given the insufficient investment in human capital (low value of "HC/#Empl."). This is precisely the critical point: In a KS strategy the notion of "efficiency" (knowledge productivity) is not attributable to a form of capital that is not human; in other words, the capitalists appropriated a share of VA in the form of EBITDA because they are "owners" of the structural capital that has been invested and not because the Structural Capital is productive (Iazzolino et al., 2017), therefore efficient.

The path that the 96 start-ups should follow is the same as the 50 described above: Go from the Quadrant IV and then reach the desired destination, that is to say the quadrant I.

Figure 8: (a) Distribution of 94 start-ups, (b) distribution of 32 start-up, (c) distribution of 53 start-ups, (d) distribution of 96 start-ups

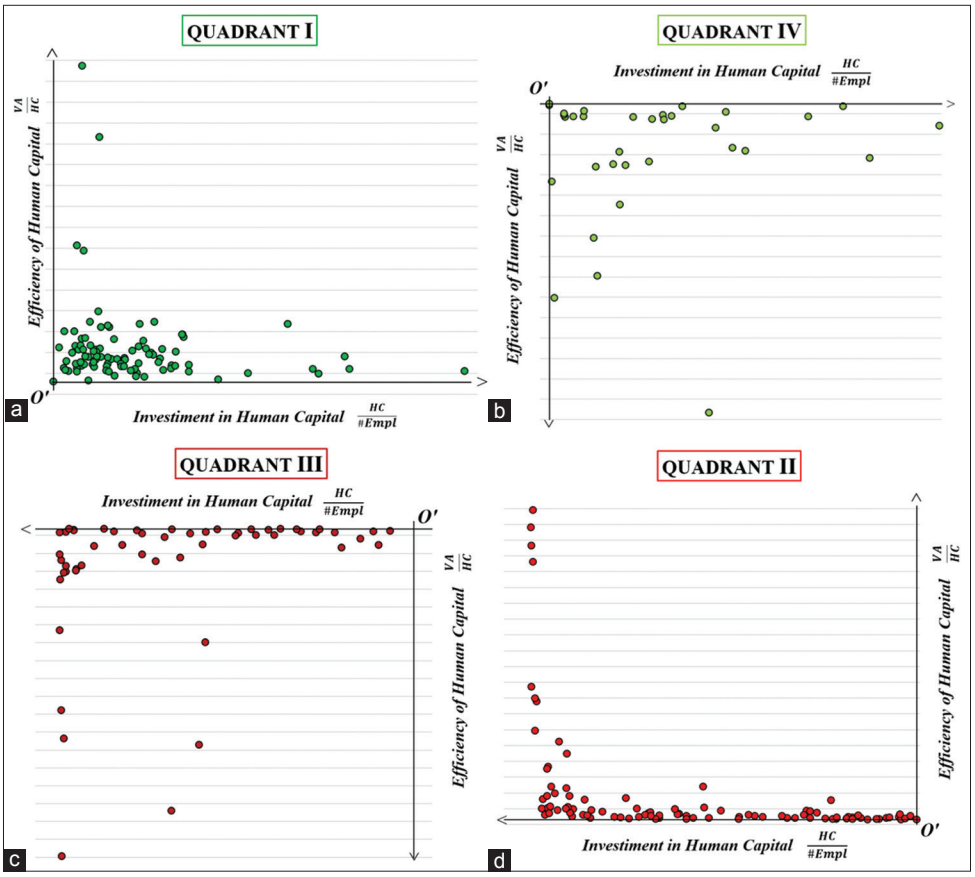


Table 3: Discussion of results

Quadrant	Conditions satisfied	Strategy pursued	Strategy to pursue in order to arrive to the Quadrant I
Quadrant I	$(HC/\#Empl.)_j > (HC/\#Empl.)_{a.i.}$ and $(VA/HC)_j > (VA/HC)_{a.i.}$	Investment in Human Capital and Knowledge productivity higher than average	Maintenance of the strategy pursued (Quadrant I)
Quadrant II	$(HC/\#Empl.)_j > (HC/\#Empl.)_{a.i.}$	Investment in Human Capital higher than average	Improvement of the strategy pursued (Quadrant IV→Quadrant I)
Quadrant III	No satisfied condition	Investment in Human Capital e Knowledge productivity lower than average	Proposing a new strategy (Quadrant III→Quadrant IV→Quadrant I)
Quadrant IV	$(VA/HC)_j > (VA/HC)_{a.i.}$	Knowledge productivity higher than average	Restoring the strategy pursued (Quadrant II→Quadrant IV→Quadrant I)

From the Figure 8d, we can note a sort of "L-shape": Start-ups that move vertically are not in an ideal "position" since they assume a very high "VA/HC" value against a cost per employee decidedly lower than the average. Instead, the situation is better for those start-ups oriented horizontally: In fact, they have a value of efficiency (given by the ratio "VA/HC") sufficiently low, to be able to believe that, starting to invest more in knowledge (thus increasing the value of "HC/# Empl."), over time it will be possible to achieve a productivity (so a value of "VA/HC") equal or even higher, but still the result of a strategy that is truly based on knowledge.

The following table (Table 3) summarizes the whole discussion made: In particular, as shown in Table 2, the conditions satisfied by the start-ups and consequently the characteristics of the strategy pursued by them are described for each quadrant; finally, in the last column, on the false line of what is depicted in Figure 7, the right direction to be followed is also entered to go up towards the Quadrant I.

7. CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCHES

We can attest that, despite the limitation of not having been able to apply the empirical analysis to the entire sample, it was nevertheless possible to report a detailed description of how the energy innovative start-ups respond to a KS.

The above discussion underlines the importance of how to adopt a KS requires a behavior that can be defined gradually: In fact, for all the start-ups that didn't respect the KS, it was specified a starting point (investment in Human Capital) and a point of arrival (efficiency of human capital). It is necessary to follow these steps, since only in this way a virtuous strategy can be achieved, a "win-win" strategy, in short, that is, as described in the previous sections, sustainable.

Surely in the future, it is desirable to be able to count on greater availability of data in order to consider more start-ups, even born in other years after 2017: In fact, the analyzed start-ups are a type of "new" company not only in the proper sense of the term "start-up" or in terms of innovative character that distinguish this particular type of start-up; moreover, the element of novelty consists of a temporal nature since the innovative start-up is introduced by the Italian Government at the end of 2012. Furthermore, considering also that the maximum duration of an innovative start-up is 5 years, these are start-ups born recently that have not yet completely completed their path from, as it is properly said, innovative start-up with high technological content: So, the issue studied in this paper is very topical.

In particular, we have found the right key to consider knowledge as the real critical success factor for these companies: Making the intangible capital of knowledge the core business of a company certainly constitutes a theme more than topical: Today people, with their knowledge, experience and behavior, are the foundation of a company; knowledge workers have the tools to deal with the turbulent situations that organizations face as well as the organization will have to reward them […] above all with a process of professional growth of experiences and skills in different roles both managerial and professional (D'Egidio et al., 2015).

Moreover, this paper is quite original. Originality is not so much to be attributed to the implementation of the research framework developed by Iazzolino and Laise (2018): The latter, in fact, begins to see its first developments since 2013 with the studies of Iazzolino and Laise (2013) up to arrive, with the study of Iazzolino and Laise (2018), to the actual fulfillment and proper to the methodology applied in this work.

The real originality of the work consists, instead, in studying innovative start-ups of the energy field by applying a specific framework based on knowledge, such as that of Iazzolino et al. (2018), which is used in this research work. In fact, for the first time we are going to explore the actual behavior that each start-up takes on a KS.

More specifically, it is surely the study of Colombelli and Quatraro (2017) that is closest to the methodology used in the research: The analysis of innovative start-ups of the energy sector, said also "green start-up" by Colombelli and Quatraro (2017), revolves around the theme of knowledge.

However, although knowledge remains the central element, the framework applied in the empirical research is detached from Colombelli and Quatraro (2017): In fact, in this paper we don't have verified, through a statistical analysis, hypotheses attesting the positive correlation between the number of start-ups in a specific province and the level of local knowledge in that same province; instead, we have studied the level that every single start-up can reach in the pursuit of a strategy based on knowledge.

In other words, everything that discussed by Colombelli and Quatraro (2017) turns out to be a consequence of the way in which the green start-ups invest in knowledge: So, in this paper we wanted to analyze precisely the step (which, moreover, constitutes, as reiterated already before, the original aspect of this work) that precedes this consequence, that's to say to understand in which terms these start-ups act towards the knowledge by studying the strategy developed by each start-up. Therefore, unlike Colombelli and Quatraro (2017), in this case, we have elaborated an internal analysis that explores the strategic behavior assumed by the start-ups in terms of knowledge and not an external analysis that studies the consequences, the positive effects that these start-ups can make to the territorial knowledge scene.

In short, this work represents an interesting and valid starting point for further researches which, on the false line of what has been done in this paper, takes into account the innovative energetic start-ups; in addition to being able to count desirably on a larger number of start-ups, in the future it will also be possible to try to focus the various studies on the theme of sustainability over time, an aspect that is certainly characteristic of a KS.

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ANNEX

Annex 1: List of 275 start-ups analyzed

#	Start-up	Year of starting activity	Number of employees (#Empl.)	Cost of employees th USD (HC)	EBITDA th USD	Value added (VA)
1	FOOD MACHINERY CRESCENZO	2013	7	203.76	157.94	361.69
2	ERGOVIEW SRL	2013	4	70.93	8.92	79.84
3	BUNIQ S.R.L.	2013	10	331.43	62.49	393.92
4	DBS S.R.L.	2013	3	63.56	24.53	88.09
5	AEP POLYMERS S.R.L.	2013	5	263.79	−74.63	189.17
6	STEM SEL S.R.L.	2013	2	60.69	−32.67	28.02
7	TOPVIEW S.R.L.	2013	5	111.52	63.33	174.85
8	HABITEKO S.R.L	2013	2	29.86	8.43	38.29
9	1SUN S.R.L.	2013	3	38.51	0.56	39.07
10	MSX TECHNOLOGY S.R.L	2013	3	72.70	15.81	88.50
11	P2R S.R.L.	2013	3	43.00	−74.63	−31.63
12	F − LAB S.R.L.	2013	3	162.70	−1.94	160.77
13	FABLAB VENEZIA S.R.L.	2013	1	0.84	16.69	17.53
14	SNAPBACK	2013	1	30.45	−20.78	9.67
15	OFFICINA DELLA RICERCA	2013	1	28.16	0.18	28.34
16	NOVYSTEM S.P.A.	2013	2	40.94	−23.96	16.99
17	ATON S.R.L.	2013	1	35.60	7.21	42.81
18	TERMOVOLTAICA S.R.L.	2013	1	14.61	0.73	15.33
19	SAFID S.R.L.	2013	4	99.63	81.65	181.28
20	STUDIO FRANCHETTI S.R.L.	2013	2	38.64	25.14	63.79
21	GFM INTEGRATION SRL	2013	8	184.42	71.83	256.25
22	PUGNALE & NYLEVE S.R.L.	2013	2	43.07	28.52	71.59
23	HTEXPLORE S.R.L.	2013	3	85.80	100.71	186.51
24	ARTECHNE S.R.L.	2013	3	40.52	24.86	65.39
25	BEAST TECHNOLOGIES S.R.L.	2013	3	85.90	−164.20	−78.30
26	REVEAL	2013	2	61.37	75.67	137.03
27	GRADO ZERO INNOVATION SRL	2013	4	142.46	5.31	147.77
28	BE SMART S.R.L.	2013	1	19.54	59.84	79.38
29	E − SCIENTIA S.R.L.	2013	1	30.00	14.29	44.30
30	BE BIOTECH S.R.L.	2013	2	24.74	6.00	30.74
31	NEST S.R.L.	2013	1	36.91	−34.15	2.75
32	AM3 SPIN − OFF S.R.L.	2013	1	24.22	26.82	51.05
33	SYSTEMDESIGN S.R.L	2013	1	0.91	3.98	4.89
34	SMART ENERGY DOCTORS	2013	1	33.78	17.41	51.19
35	UMBRIA KINETICS	2013	2	12.04	−37.23	−25.18
36	INTACT	2013	1	14.92	4.68	19.60
37	AMIGO	2013	1	5.01	11.39	16.40
38	EVOLUTION TECHNOLOGY LABORATORIES S.R.L.	2013	1	20.50	−8.79	11.70
39	BIOSENSING TECHNOLOGIES	2013	1	14.12	−1.50	12.62
40	IVM S.R.L.	2014	9	312.24	288.21	600.45
41	ETC SUSTAINABLE SOLUTIONS	2014	5	107.11	131.86	238.97
42	DOLCESALATO GROUP SRL	2014	7	155.06	−818.26	−663.21
43	BE-ECO - FOR SUSTAINABLE CONSTRUCTION S.R.L.	2014	1	1.61	19.03	20.64
44	4E-CONSULTING SRL	2014	7	348.48	409.37	757.85
45	DOLPHIN FLUIDICS S.R.L.	2014	6	238.96	−35.99	202.96
46	ADVANTECH TIME S.R.L	2014	4	139.46	120.72	260.18
47	LEONARDINO S.R.L	2014	2	40.55	33.36	73.91
48	SYNTHESIS S.R.L.	2014	2	25.20	181.93	207.13
49	ATENA SCARL	2014	1	20.54	60.36	80.90
50	ATEN IS S.R.L.	2014	2	15.06	5.86	20.92
51	OFFICINE CREATIVE MARCHIGIANE S.R.L.	2014	2	17.60	15.32	32.91
52	MULTIMED ENGINEERS	2014	4	110.13	60.00	170.13
53	BRAIN2MARKET S.R.L.	2014	2	46.07	50.90	96.96
54	ENERGETIKA GREEN S.R.L.	2014	2	52.85	19.52	72.37
55	ONE INNOVATIVE S.R.L.	2014	2	21.59	10.81	32.40
56	MATERIALUCE S.R.L.	2014	1	15.44	11.43	26.87
57	UPTOFARM S.R.L.	2014	1	6.30	13.00	19.30

(Contd...)

Annex 1: ***(Continued)***

#	Start-up	Year of starting activity	Number of employees (#Empl.)	Cost of employees th USD (HC)	EBITDA th USD	Value added (VA)
58	UB-CARE S.R.L.	2014	3	46.59	6.91	53.50
59	ADVANCED MACHINES FOR POWER AND PROPULSION S.R.L	2014	1	1.12	10.88	12.00
60	ORIENT S.R.L.	2014	2	40.46	7.15	47.60
61	GREENTECH S.R.L.	2014	1	11.73	−29.23	−17.50
62	NANOFABER S.R.L.	2014	1	1.89	7.01	8.89
63	STARTUP NETWORK S.R.L.	2014	1	5.09	12.70	17.79
64	FUTURA RE-LIFE S.R.L.	2014	3	87.04	−57.52	29.52
65	TEST 1 S.R.L	2014	1	13.74	−81.55	−67.81
66	RESEARCH NEW TECHNOLOGIES	2014	1	75.09	4.26	79.35
67	IL GRAND TOUR S.R.L	2014	7	127.13	−76.25	50.88
68	EXIMOTION S.R.L.	2014	1	2.60	1.06	3.67
69	WILL TECHNOLOGY S.R.L	2014	1	3.84	−11.82	−7.98
70	START GREEN APP S.R.L	2014	1	0.85	−19.60	−18.74
71	NURIDEAS S.R.L.	2014	2	17.57	−8.64	8.94
72	VITA S.R.L.	2014	2	48.28	−96.40	−48.12
73	NEXT2U S.R.L.	2014	2	60.50	29.91	90.42
74	SMARTS - S.R.L.	2014	2	45.27	67.01	112.28
75	2D1M MECCANICA S.R.L.	2014	5	47.18	54.38	101.56
76	SEAMTHESIS	2014	7	132.09	64.16	196.24
77	AR ENGINEERING S.R.L	2014	5	98.98	55.92	154.89
78	AGEVOLUZIONE	2014	2	35.53	35.54	71.07
79	BEELAB S.R.L.	2014	5	103.71	41.63	145.33
80	T - SIGMA S.R.L	2014	5	120.04	26.82	146.86
81	EASYTECH S.R.L.	2014	1	0.97	11.95	12.92
82	ZENUP S.R.L.	2014	4	97.94	33.49	131.43
83	OFFICINEAPOGEO	2014	2	13.43	−859.04	−845.61
84	TISSUEGRAFT S.R.L.	2014	2	30.09	18.28	48.38
85	ROUTE220 S.R.L.	2014	3	29.55	−111.22	−81.67
86	D − AIR LAB S.R.L.	2014	3	49.54	−124.04	−74.51
87	AVANIX S.R.L.	2014	1	1.74	15.04	16.78
88	MOBYGIS S.R.L.	2014	1	13.32	9.59	22.91
89	GLYCOLOR S.R.L.	2014	2	44.57	14.36	58.94
90	NANOSILICAL DEVICES SRL	2014	5	1.51	50.60	52.12
91	MIVELL	2014	2	27.71	9.34	37.05
92	PHPOWER S.R.L.	2014	3	4.97	−49.70	−44.73
93	ICAN ROBOTICS S.R.L.	2014	3	20.65	7.39	28.04
94	CROSSING S.R.L	2014	1	0.14	7.04	7.18
95	JPWORKS S.R.L.	2014	2	23.78	−16.53	7.25
96	INTELLIGENT INFRASTRUCTURE INNOVATION	2014	1	0.13	14.79	14.92
97	JOINTHERAPEUTICS S.R.L.	2014	2	43.98	−90.80	−46.82
98	MELIXA S.R.L.	2014	2	25.16	−61.11	−35.95
99	PHYSIS	2014	1	5.57	−91.12	−85.55
100	COMPODYNAMIC ENGINEERING	2014	1	0.82	3.44	4.26
101	SI INNOVA	2014	2	31.05	−6.19	24.86
102	NEW CARE TECHNOLOGY S.R.L.	2014	1	11.04	−21.07	−10.02
103	WAVE TRASTIC S.R.L.	2014	1	0.30	−35.07	−34.77
104	BARK'S S.R.L.	2014	5	103.10	22.61	125.70
105	INNOVATION SERVICE GROUP UNIPERSONALE S.R.L.	2014	3	19.81	24.00	43.81

(Contd...)

Annex 1: ***(Continued)***

#	Start-up	Year of starting activity	Number of employees (#Empl.)	Cost of employees th USD (HC)	EBITDA th USD	Value added (VA)
106	CALIETRA S.R.L.	2014	1	16.84	−99.69	−82.85
107	UBACEC ENERGIA S.R.L.	2014	1	0.75	−0.73	0.02
108	NEILOS S.R.L.	2015	12	273.43	1548.68	1822.11
109	IT PAS SRL	2015	45	1255.29	133.78	1389.07
110	AYES S.R.L.	2015	32	810.28	270.90	1081.18
111	BIOFIELD INNOVATION S.R.L.	2015	7	160.10	183.06	343.16
112	CENTER FOR OUTCOMES RESEARCH AND CLINICAL EPIDEMIOLOGY	2015	9	274.59	122.19	396.78
113	TURINGSENSE EU LAB S.R.L.	2015	9	238.54	78.34	316.88
114	INNOVHEART S.R.L.	2015	9	505.06	−911.36	−406.30
115	3DNA S.R.L.	2015	7	70.53	81.10	151.63
116	OFFICINE ZANITONI S.R.L	2015	5	106.13	−19.12	87.00
117	MELO S.R.L.	2015	2	63.03	22.10	85.13
118	LIFETOUCH S.R.L.	2015	3	63.95	63.85	127.80
119	MECCANICA 42 S.R.L.	2015	3	60.91	35.71	96.62
120	BIOVELOCITA S.R.L.	2015	4	144.21	−1340.25	−1196.04
121	BLUBRAKE S.R.L.	2015	4	102.81	−207.48	−104.67
122	VDGLAB SRL	2015	5	120.08	45.21	165.29
123	THETIS MICROELECTRONICS	2015	5	119.33	18.80	138.14
124	POP LAB S.R.L.	2015	2	39.07	4.30	43.38
125	H2BOAT SOCIETA' COOPERATIVA	2015	2	9.78	16.44	26.23
126	UMBRIA RISORSE S.P.A.	2015	1	28.03	−2.08	25.95
127	RIVEN S.R.L.	2015	2	19.54	16.10	35.63
128	STELLAR PROJECT S.R.L.	2015	1	33.10	3.63	36.73
129	INTELLISYST S.R.L.	2015	1	22.34	11.60	33.94
130	L.C.M. INDUSTRIES S.R.L.	2015	2	41.58	35.01	76.59
131	GLITCH FACTORY S.R.L.	2015	2	38.82	8.71	47.53
132	PLANBEE S.R.L.	2015	2	21.70	−10.64	11.06
133	PBK S.R.L.	2015	1	0.21	20.26	20.47
134	ETNA ROBOTIX S.R.L.	2015	1	38.18	−17.51	20.67
135	ATOMSENSORS S.R.L.	2015	1	18.41	0.98	19.39
136	UBA PROJECT	2015	1	0.19	−3.35	−3.16
137	MATERIALSCAN S.R.L.	2015	2	17.52	0.39	17.91
138	R&D ENGINEERING S.R.L.S.	2015	1	1.24	4.08	5.32
139	WERDERA S.R.L.	2015	1	1.83	1.90	3.73
140	CARDIONICA	2015	1	0.79	15.03	15.82
141	A.R.T.E. S.R.L.	2015	1	0.63	4.73	5.36
142	SMART CITY & LAND SOLUTION	2015	1	0.10	−1.49	−1.39
143	SPIN8 S.R.L.	2015	1	4.45	−82.57	−78.12
144	ARIA S.R.L.	2015	1	0.84	−19.97	−19.14
145	GLOO S.R.L.S.	2015	1	0.39	−0.84	−0.45
146	FRAL S.R.L.	2015	1	5.18	−818.26	−813.09
147	A.R.G. LAB	2015	1	1.30	37.95	39.24
148	CAMAJORA S.R.L.	2015	7	109.88	21.02	130.90

(Contd...)

Annex 1: ***(Continued)***

#	Start-up	Year of starting activity	Number of employees (#Empl.)	Cost of employees th USD (HC)	EBITDA th USD	Value added (VA)
149	GREEN ENERGY STORAGE S.R.L.	2015	1	32.74	−9.61	23.13
150	LORO RETAIL S.R.L.	2015	10	21.81	34.09	55.90
151	ATENA S.R.L.	2015	4	109.26	6.60	115.87
152	3I − IMPRESA INGEGNERIA ITALIA S.R.L.	2015	2	23.17	75.41	98.57
153	POLI4LIFE S.R.L.	2015	2	14.69	64.73	79.42
154	SMARTICKET S.R.L.	2015	4	80.43	54.01	134.45
155	ORANGE R&D S.R.L.	2015	7	56.13	177.13	233.26
156	GLOMEX ENGINEERING S.R.L.	2015	3	36.09	82.97	119.06
157	INVENTIVE ENGINEERING & TECHNOLOGY	2015	2	44.81	18.17	62.98
158	PIELLE X S.R.L.	2015	1	15.47	26.34	41.81
159	POWERSTAR ITALIA S.R.L.	2015	2	9.24	6.54	15.78
160	PUDA SOCIETA' COOPERATIVA A R.L.	2015	2	4.94	7.38	12.32
161	SCENT S.R.L.	2015	1	9.19	13.79	22.98
162	MAPLE S.R.L.	2015	1	29.94	13.44	43.38
163	LEAF	2015	1	1.76	4.07	5.83
164	GR RESEARCH S.R.L.	2015	2	44.15	6.62	50.77
165	EMC INNOVATION LAB S.R.L.	2015	3	10.82	−14.17	−3.35
166	ECO2ZONE S.R.L.	2015	2	53.20	−32.20	21.00
167	RENOVO BIOCHEMICALS S.R.L.	2015	1	31.38	−17.95	13.44
168	COING	2015	4	81.80	46.64	128.44
169	BLUEFOUNDATION SRL	2015	1	1.67	7.50	9.17
170	SALESOAR S.R.L.	2015	4	76.73	−45.44	31.29
171	ANTARES INNOVATION	2015	1	1.62	40.09	41.70
172	SPIN-OFF CINFAI S.R.L.	2015	2	43.92	22.89	66.82
173	OXIDEA	2015	1	4.07	32.26	36.33
174	COGNIMADE S.R.L.	2015	1	18.06	5.26	23.32
175	E-LABOR@	2015	1	11.73	5.01	16.74
176	CENTRO DI ORIENTAMENTO E FORMAZIONE PER IMPRESE E LAVORATORI S.R.L.	2015	1	29.44	17.23	46.67
177	HIFIVE S.R.L.	2015	3	53.73	3.92	57.65
178	GENETIC SERVICES S.R.L.	2015	1	13.26	3.07	16.33
179	APTEON S.R.L.	2015	2	47.51	3.29	50.80
180	SMILING WAVE ITALIA	2015	2	14.50	-7.79	6.71
181	EMMA SRL	2015	1	15.91	18.63	34.55
182	AGROBIOTECH	2015	1	4.54	18.42	22.96
183	EMTESYS S.R.L.	2015	1	24.95	−1.49	23.46
184	IN.SIGHT SRL	2015	4	26.37	0.21	26.58
185	MATTERMOVE S.R.L.	2015	1	31.97	2.25	34.22
186	FIFTH INGENIUM	2015	1	0.16	16.42	16.58
187	UMBRIA BIOENGINEERING TECHNOLOGIES	2015	1	16.17	−4.17	12.00
188	SUNTA S.R.L.	2015	2	25.34	1.79	27.13
189	NOVA LABS S.R.L.	2015	1	0.94	4.47	5.40
190	GREENERTECH S.R.L.	2015	1	21.96	5.72	27.68
191	ORATIO.ORG	2015	1	0.71	1.14	1.85
192	ARAKNIA LABS S.R.L.	2015	2	10.94	4.05	15.00

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Annex 1: ***(Continued)***

#	Start-up	Year of starting activity	Number of employees (#Empl.)	Cost of employees th USD (HC)	EBITDA th USD	Value added (VA)
193	APTSOL	2015	1	6.43	−779.98	−773.55
194	DRIMS SRL-DIAGNOSTIC RETROFITT ING AND INNOVATION IN MATERIAL	2015	1	1.58	6.30	7.88
195	SKYTRONICS S.R.L.	2015	1	0.58	2.26	2.84
196	AGR S.R.L.	2015	1	0.38	−9.24	−8.86
197	DGT ENGINEERING S.R.L.	2015	9	397.08	0.54	397.62
198	SAILADV S.R.L.	2015	1	0.35	15.84	16.19
199	ATHENA S.R.L.	2015	1	0.28	−7.08	−6.79
200	VAXYNETHIC S.R.L.	2016	10	312.83	82.83	395.66
201	ITAR S.R.L.	2016	3	60.90	448.43	509.34
202	BI RESEARCH S.R.L.	2016	6	101.97	63.36	165.33
203	ARISTON THERMO INNOVATIVE TECHNOLOGIES S.R.L.	2016	13	841.60	−718.08	123.53
204	FOCUS INNOVAZIONE S.R.L.	2016	3	77.64	17.23	94.87
205	CENTRO SERVIZI E DISTRIBUZIONE S.R.L.	2016	1	7.29	90.33	97.62
206	ACCADEMIND S.R.L	2016	11	381.40	354.33	735.73
207	TEKNEIDOS S.R.L	2016	8	469.01	48.53	517.55
208	RIS LAB	2016	6	190.88	110.04	300.92
209	H-GLOBAL S.R.L	2016	4	113.75	72.64	186.39
210	UFLYSYS S.R.L.	2016	7	126.14	−67.82	58.32
211	INVICTUS S.R.L.	2016	9	224.25	−365.66	−141.41
212	GIUSTO SCIENTIFIC S.R.L.	2016	7	136.93	4.84	141.77
213	CGT SPINOFF IMPRESA SOCIALE	2016	1	11.48	18.69	30.16
214	DIVION SRL	2016	1	5.47	7.30	12.77
215	REGALGRID EUROPE S.R.L.	2016	3	121.74	−195.08	−73.34
216	SRT S.R.L.	2016	1	0.29	13.49	13.78
217	CRS SRL	2016	3	77.89	12.65	90.54
218	RE3CUBE S.R.L.	2016	3	6.37	−2.56	3.81
219	SOLEAIMPRESA 4.0 S.R.L.	2016	1	57.94	23.48	81.42
220	MAESTRALE CONSULTING S.R.L.	2016	4	51.38	33.28	84.66
221	ENGENOME S.R.L.	2016	2	52.60	8.83	61.43
222	KAPPATEN SRL	2016	3	40.49	3.94	44.43
223	CAPTIVE SYSTEMS S.R.L.	2016	1	29.21	−2.58	26.63
224	CARBON MIND SRL	2016	2	56.82	13.67	70.49
225	FEATURE JAM S.R.L.	2016	1	53.39	5.49	58.88
226	TURBOALGOR S.R.L.	2016	6	233.95	−354.26	−120.31
227	GRAPHENE-XT SRL	2016	1	3.85	−56.50	−52.65
228	ENECOLAB S.R.L.	2016	1	24.18	0.92	25.11
229	IWT IAVARONE WOOD TECHNOLOGY S.R.L.	2016	2	10.39	−6.42	3.97
230	ENERGREENUP S.R.L.	2016	1	14.50	0.83	15.33
231	NAPS LAB	2016	1	0.79	6.95	7.75
232	INFOPOWER RESEARCH S.R.L.	2016	5	75.52	−111.52	−35.99
233	SEP VALTELLINA S.R.L.	2016	2	9.74	−49.36	−39.62
234	ALES TECH S.R.L.	2016	1	9.01	−33.52	−24.51
235	SISSPRE	2016	1	8.21	−22.84	−14.63
236	BREED S.R.L.	2016	1	0.11	−6.10	−5.99
237	KRYAX S.R.L	2016	1	6.23	11.14	17.36

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Annex 1: ***(Continued)***

#	Start-up	Year of starting activity	Number of employees (#Empl.)	Cost of employees th USD (HC)	EBITDA th USD	Value added (VA)
238	ENVISION S.R.L.	2016	1	6.11	23.58	29.69
239	CAPOLAVORI S.R.L.	2016	4	38.28	−31.59	6.69
240	TRIM S.R.L.	2016	1	0.12	24.25	24.37
241	SEA EAGLE INDUSTRIES GROUP	2016	1	12.89	−138.97	−126.08
242	THIRD HOUSE S.R.L.S.	2016	2	49.97	−158.98	−109.01
243	BEYOND ENGINEERING S.R.L.	2016	1	0.21	24.75	24.96
244	GLASS TO POWER S.P.A.	2016	2	5.91	−55.97	−50.05
245	BRENNERO INNOVAZIONI TECNOLOGICHE SRL	2016	1	6.73	−14.97	−8.23
246	BEHUB S.R.L.	2016	1	0.89	1.95	2.85
247	PEXTA SRL	2016	2	5.29	17.78	23.08
248	MEMOORIA S.R.L.	2016	1	2.57	−4.86	−2.29
249	QMRI TECH S.R.L.	2016	2	7.18	5.19	12.37
250	ALIKA S.R.L.	2016	2	7.74	4.32	12.05
251	ENERGY@WORK	2016	2	8.43	1.43	9.86
252	GREEN ENERGY S.R.L.	2016	1	10.12	−2.33	7.79
253	ME.MO. S.R.L.	2016	1	8.10	−32.64	−24.55
254	SUPERGAME S.R.L.	2016	1	0.11	−0.25	−0.14
255	PENG S.R.L.	2016	1	0.74	−1.00	−0.26
256	NDG NATURAL DEVELOPMENT GROUP S.R.L.	2017	1	14.58	−135.76	−121.18
257	AORTICLAB ITALY S.R.L.	2017	2	23.46	70.30	93.77
258	SCORPIO ENGINEERING SRL	2017	2	40.19	10.73	50.92
259	NEXMAN S.R.L.	2017	3	15.93	1.66	17.59
260	LABBLU S.R.L.	2017	3	15.36	18.93	34.29
261	COMM5G S.R.L.	2017	1	6.59	−60.81	−54.22
262	RAYLAB S.R.L.	2017	2	96.87	−57.37	39.50
263	ROTEAX-GO SRL	2017	1	33.65	5.75	39.39
264	TECNO EDILE TOSCANA S.R.L.	2017	1	3.10	8.60	11.70
265	SGRPRO S.R.L.	2017	1	13.73	18.37	32.11
266	TEXTILE, CHEMICAL AND PROCESS ENGINEERING	2017	2	22.24	10.97	33.21
267	AKSOLUT S.R.L.	2017	1	0.17	−17.35	−17.18
268	IQUADROCI S.R.L.	2017	1	2.36	17.47	19.83
269	TLG S.R.L.	2017	2	2.19	−45.78	−43.60
270	MIRO INGEGNERIA ACUSTICA	2017	1	18.03	−8.99	9.04
271	THE SEA OPPORTUNITIES S.R.L.	2017	2	0.79	−16.77	−15.98
272	S.G.C. SMART GREEN CONSULTING	2017	2	1.07	−0.32	0.75
273	FTT S.R.L.	2017	4	86.77	−360.59	−273.82
274	ILOOXS TECH S.R.L.	2017	2	0.40	−72.61	−72.22
275	RHAZES S.R.L.	2017	2	0.24	−6.76	−6.52