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Assessing the Determinants of Performance in the Recycling Business: Evidence from the Italian Context

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Assessing the determinants of Recycle Business performance: evidences from the Italian context

Abstract

This study aims to shed light on the elements that can influence the performance of green businesses, more specifically organizations active within the recycle business. After have defined and identified which are the green businesses, it focuses on the Italian recycling business, studying also whether green practices of a green business can influence the organizations' performance.

Thanks to a quantitative methodology applied, the results show that big and old organizations where public entities are present within the shareholders demonstrate better economic results. The originality of the study lies in the link between green practices and green business suggesting which is the efficient structure and driving elements of the recycling organizations. These findings offer several contributions to theory, practice and for policymakers.

Keywords: recycle; green business; green practices; green economy; sustainability.

1 Introduction

The “Green economy” and “Sustainable development” have become the focus of many studies in literature and of both national and international directives (Bresciani et al., 2016; Franceschelli et al., 2018). For example, the IEA¹ Report presented in 2016 during the COP 22 in Marrakesh, demonstrates that the global economy is becoming “greener”.

Despite this recent growing interest, the environment and its relative issues have played a key role in human life and culture since ancient times. In fact, the Latins and Greeks stressed the link between the man and the environment, underling the importance of preserving the natural equilibrium. However, human activities, whether in exploiting natural resources or in causing accidents, have altered the natural equilibrium and irremediably damaged the environment.

For these reasons, international literature has investigated topics related to environmental issue, CSR and so forth (McWilliams & Siegel, 2000; Wagner, 2011; Ali et al., 2017; Marco-Fondevila et al., 2018). For the best of our knowledge, overall, researchers have found substantial evidence of the importance of the Green Economy, but less within the discipline of business administration.

This paper aims to fill this gap by shedding more light on how organizations are involved in the Green Economy. In particular, given the development of new “Green businesses” (that means businesses where organizations offer environmental goods or services specifically aimed at high environmental performance) the research aims to study the factors that influence the performance of these businesses as the recycling business and if green practices of green business influence the organization's performance.

To reach this goal, we first analyze the literature on the link between the natural environment and organizations, in order to propose an adaptation of the classification of the existing businesses that focus their attention on environmental issues (we will call them “green businesses”). Then, using a quantitative methodology, five hypotheses are developed regarding the possible factors that can be correlated with the performance of the recycling business (a clearly green business) in Italy.

In particular, we have developed a quantitative analysis on a sample of 87 Italian organizations whose core business is recycling, and using a model of multiple linear regression, variables correlated with and influencing performance have been studied.

The fact that economic efficiency of a green activity has positive effects on the environment itself, links the economic and environmental performance of organizations active within a green business.

¹ International Energy Agency.

In fact, waste management, and in particular the recycling activity, is a concrete application of sustainable development policy. The purpose of these the quantitative analyses is to evaluate empirically a business that is part of the Green economy model linking business administration and the Green economy.

2 Theoretical background

2.1 Definition of green businesses

The paper focuses on the recycling business, a part of the green businesses (Ali et al., 2017; Marco-Fondevila et al., 2018). To investigate it, we have analyzed the *economic processes considered within each organization in order to investigate the operation rules*, in other words the business administration (Nobolo, 2016), with the aim of seeking the general rules of the business.

“*Fondazione per lo Sviluppo Sostenibile*”, an Italian association that has reported the state of Green economy in Italy (FSS, 2015), using the international dual classification (used by: Environmental Goods and Services Sector [EGSS], UNEP, Eurostat and OECD), distinguishes between green practices and green businesses.

According to the international and national classification, green businesses *consist of activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes cleaner technologies, products and services that reduce environmental risk and minimize pollution and resource use* (OECD, 1999).

VedoGreen is an Italian association which aim is *helping Italian green companies to ensure capital growth, list on the stock market, dialogue with the media and communicate their values to stakeholders*.² It was founded in 2011 and it is part of IR Top Group. According to UNEP, VedoGreen believes that Green economy affects both typical sectors of environmental policies and other industries that do not depend on incentives. Furthermore, it studies the Italian Green economy and it has created the first Italian database on Italian green organizations (over 3.000 companies included). VedoGreen has classified the green businesses in ten groups: Agribusiness; Eco-building; Eco-mobility; Environmental Services; Green Chemistry; Lighting Solutions; Smart Energy; Waste Management; Water, Air & Noise Treatment; Life Sciences & Biotech.

The approach of the two classifications is different. In fact, the one recommended by FSS and UNEP focuses on the activities classified by the sector of the economy. VedoGreen, instead, does not pay attention on the sector of the economy, but focuses on the core of the activity that means the business-environmental objective.

Robert Richardson (2013), ecological economist at Michigan State University, argued that green business sectors should be the ones corresponding to the *Green economy objectives* (Richardson, 2013, p. 9). As a consequence of that, he identifies six economic sectors:

1. Green energy: development of renewable sources of energy such as wind, solar, and geothermal energy;
2. Green transportation: development of renewable fuels, fuel-efficient vehicles, and electric cars; expansion of public and alternative forms of transportation;
3. Green design and construction: integrated urban environmental planning; advancements in energy and water efficiency; reusable or recyclable products, materials, and infrastructure;
4. Green agriculture: expansion of organic farming, conservation agriculture, and community based food systems;
5. Green water management: water reclamation, reuse, and recycling; rainwater catchment systems; low-water landscaping;
6. Green waste management: expansion of municipal recycling and composting; recyclable and compostable packaging and products.

² <http://www.vedogreen.it/>.

In this paper, we focus our study on “green waste management” as one of the economic sector.

2.2 Recycling business literature

The literature on household waste recycling is extensive. Among them, someone focuses on a specific context: Abbott et al. (2011) on the UK situation; Yau (2010) stressed the efficacy of waste recycling for Hong Kong. Ferrara and Missios (2012) have compared ten countries (from Europe, Australia, US, Asia) to examine their waste prevention policies, and the recycling behavior.

The most complete definition of recycling may be drawn from the legislation in force, Directive 2008/98/CE of the European Parliament and of the Council: *‘recycling’ means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.*³

Therefore, the European directive, that *should help move the EU closer to a ‘recycling society’, seeking to avoid waste generation and to use waste as a resource*⁴, identifies the recycling activity as one of the main paths for a sustainable waste management.

Many studies have analyzed the effects and reasons for the implementation of environmental strategies. It has been shown that more and more companies implement environmental strategies as a key success factors (Maas et al., 2014; Siegel, 2009; Aragon-Correa & Sharma, 2003; Sharma & Vredenburg, 1998; Gouldson, 2004; Ambec & Lanoie, 2008; Anderson & Anderson, 2009; Al-Najjar & Anfimiadou, 2012; Ardito & Dangelico, 2018).

So far, little attention has been given to the recycling business, and on the fact that its economic performance has a direct effect on the environment⁵. This concept links the importance of good practices within a green business. So, given the aim of the work, which regards the assessment of the business recycling performance, environmental management required considerations too. This assertion is supported by all the studies that use as environmental performance variable the percentage of total waste treated, recycled or recovered (Dobler et al., 2014).

Consistently, Green economy takes into account two different aspects: the green one focuses on environmental protection and so on green actions, the economic one focuses on the economic aspect, so efficiency and organizational performance.

3 Hypotheses development

This section aims to stress some important features of organizations that are active in the recycling industry, proposing several research hypotheses.

Organization age is often an important variable to consider during the analysis of an organization. It can influence strategies and activities. Brynjolfsson et al. (2011, p. 7) claim that *firm age, as a proxy for firm experience, has been suggested to have two opposing effects in the literature*. The first effect is organizational inertia, which makes it difficult to change strategy and to face environmental changes (Hannan & Freeman, 1984; Nelson & Winter, 1982); the second effect is the generation of higher quality of innovation made by young firms.

³ Directive 2008/98/CE, article 3.

⁴ Directive 2008/98/CE, introduction.

⁵ In fact, if an organization carries out an activity for environmental protection, the efficiency of the activity will have a positive effect on the environment itself.

In general, organization age may have a positive effect on productivity by learning-by-doing, because firms accumulate production experience with age (Brynjolfsson et al., 2011; Argote et al., 2003; Cohen & Levinthal, 1989; Levitt & March, 1988).

Within the green business here analyzed, the idea underlying the recycling activity is not particularly new and innovative. It is argued that Plato, in the 4th century BC, urged recycling in times of need, such as during wars. Therefore, on the one hand the business is really ancient, and old organizations have. Furthermore, the organizations active in the recycling business primarily use long lifecycle machinery. So old organizations should have already finished paying the expenses incurred during the initial phase of a business.

On the other hand, the recycling business is very dynamic. The ratio and the needs linked to recycling activity have changed. The emergence of new necessities, the obligation of compliance with national and international standards, have meant that the business has had to evolve to meet the new requirements. Modern organizations may be better suited to satisfy the modern requirements: they can enter the market by directing their activities at the exact needs of that place at that time.

According to the above arguments, and considering that on the one hand the recycling business is not based on a new idea (waste recycling), and on the other hand organization productivity increases with age through learning-by-doing, we expect that the older an organization, the higher the economic performance.

Hypothesis 1: Organization performance of recycle organizations is positively associated with organization age.

Organization size naturally influences the economic result and so has effects on profitability (Dahmash, 2015). It is often interpreted differently: as a source of organizational cost, for example caused by monitoring activity and agency problems, or a measure of diversification (Hansen & Wernerfelt, 1989). Furthermore, skilled managers are usually attracted by large organizations offering a higher level of managerial ownership (Himmelberg et al., 1999).

Therefore, the organization's growth can create several problems. In addition to the above concerns, numerous accounting studies have found that large organizations have to face communication and control problems (Merchant, 1981; 1984) and as a consequence of that the larger an organization the more specialized and sophisticated become the accounting and control processes (Ezzamel, 1990; Libby & Waterhouse, 1996).

Nevertheless, large organizations present several advantages. For example, large organizations achieve economies of scale, which can bring down production costs. Previous research shows that the larger an organization, the more managerial stakes are reduced (Himmelberg et al., 1999). Hoque and James (2000), measuring organization size using the number of employees and the organization performance using balanced scorecards (BSC⁶), find that there is a positive relation between the two variables. As a consequence of that, *as size increases, organizations find it more practical and useful to place greater emphasis on the BCS that supports strategic decision, as the BSC incorporates much broader measures of the performance of organization* (2000, p. 11).

In line with the above arguments, previous research found a positive relationship between profitability and company size (Alexander, 1949; Stekler, 1964; Hall & Weiss, 1967; Scherer, 1973; Ravenscraft & Scherer, 1987; Fiegenbaum & Karnani, 1991; Helfat et al., 2007; Dogan, 2013).

The preceding discussion can be summarized with the following hypothesis:

Hypothesis 2: Organization performance of recycle organizations is positively associated with organization size.

⁶ The BSC measures performance through four dimension: financial (or shareholders), customers, internal business process, and learning and growth (Hoque & James, 2000, p. 1).

Researchers have found substantial evidence that innovation leads to good economic performance (Vrontis et al., 2017; Santoro et al., 2018b; Thrassou et al., 2018a, 2018b). Innovative capabilities of organizations are a critical determinant of both organization performance and competitive advantage (Helfat & Peteraf, 2003; Santoro et al., 2018a). The extent and the duration of the advantages depend on the type of innovation and on the way that it has been obtained.

Then, innovation is linked with at least three factors: first, innovation can be linked also with organization age. Previous research shows that young organizations generate higher quality innovations (Henderson & Clark, 1990; Balasubramanian & Lee, 2008).

Second, innovation depends also on the scale of the *market because the innovation or invention costs must be incurred only once and after success the discovered new idea can be used for the production of infinite units* (Brynjolfsson et al., 2011, p. 7).

Third, the number of patents, that in this research represents the degree of innovation (Ahuja, 2000), can have an *economically and statistically significant impact on firm-level productivity and market value* (Bloom & Reenen, 2002).

The ability to create new products or processes is particularly important within the Green economy field. As a matter of fact, Jennings and Zandbergen (1995) claim that innovation is one of the strategies used to achieve sustainability. The Italian Council for the Green Economy considers eco-innovation a top priority, in particular the transition to the Green economy implies the ability to innovate production cycles and consumption through the development and implementation of eco-innovation that takes into account the economic, socio-environmental dimensions as essential components of sustainable development (Consiglio nazionale della Green economy, 2015).

According to previous studies, and the specific relevance of innovation within green businesses, it is expected that patents are positively related to performance.

The preceding discussion can be summarized with the following hypothesis:

Hypothesis 3: Organization performance of recycle organizations is positively associated with the organization degree of innovation.

In addition to the previous three hypotheses, it is interesting to study the effects and correlations of some qualitative⁷ variables that are particularly relevant in a green economy context.

It has been argued previously that the recycling business involves various areas. If the matter is analyzed from a business ethics point of view, waste is really dangerous for human health. This aspect is particularly relevant in states where healthcare is public, as it is in Italy. In such countries, environmental protection has not only a direct effect on human health, but also on public spending. As the figure below shows, the current public health spending is increasing (ISTAT⁸).

For these reasons, public entities should be particularly interested in the efficiency and profitability of organizations that can help to diminish or control the waste issue for two main reasons. First, the better managed the recycling organizations, the fewer people risk illness; second, in a country where the healthcare system is public, the fewer people get sick, the less government spends.

These aspects can influence the governance of recycling organizations. In fact, waste management is strongly related to the public sector, and as a consequence, *poor management of waste led to contamination of water, soil and atmosphere and to a major impact on public health* (Giusti, 2009, p. 2230).

Institutional shareholding, therefore must be particularly careful about the performance of recycling organizations (Hood et al, 1999) because governance can impact on *good performance* (Magli, Nobolo, Ogliari, Arienti, & De Toni, 2011).

The preceding discussion can be summarized with the following hypothesis:

⁷ The “qualitative” feature comes from statistic that consider qualitative to all the dummy variables.

⁸ www.istat.it.

H4: There is a correlation between organization performance and the presence of public authorities in the shareholding structures of Italian recycling organizations.

Corporate social responsibility (CSR) refers to a company's performance on a range of social and environmental issues over time (Briscoe & Safford, 2008; Ali et al., 2017; Marco-Fondevila et al., 2018). This assertion stresses the connection between social and environmental aspects, and the fact that CSR evaluates both of them.

Social and environmental aspects should be integrated with business management (Wagner, 2007). This integration has effects on both economic and environmental performance (Wagner, 2011).

Although environmental and social aspects should be considered together and are part of CSR, this work analyzes the two aspects through different variables because they refer to different aspects. In fact, especially analyzing a green business, socio and economic variables can be expressions of two distinct interests.

The relationship between environmental performance and economic success can vary (Schaltegger & Synnøstvedt, 2002). Ameer and Othman (2012) studying global sustainable corporations find that the more organizations implement sustainability practices, the greater the financial performance and growth. The same positive correlation is found by other authors (e.g. Weber, et al., 2008). One possible explanation is that individuals are willing to pay more for products or services that do not have an environmental impact (Rosewicz, 1990).

The ISO 14001 certification is a way to implement the environmental management system and *it is a determinant of environmental performance* (Klassen & McLaughlin, 1996, p. 1212). Environmental management affects both corporate and functional strategies and environmental performance affects an organization's financial performance (Klassen & McLaughlin, 1996).

Because recycling organizations, by their nature, implement environmental activities, it is possible that they pay more attention to extra environmental practices, and are willing to certify the organization.

The effect of social responsibility on an organization's performance is ambiguous. During the 1980s, there were two opposite views (Frederick, 2006). The first view is that organizations have to choose between looking for social responsibility or financial performance. The second view, instead, is that organizations benefit from the development of social responsibility strategies (McGuire et al., 1988). Several organizations, to demonstrate their attention to the social aspect, have promoted gender diversity. Consistent with previous findings, *greater female representation on corporate boards of large European firms can increase firm value indirectly* (Isidro & Sobral, 2015, p. 1).

As demonstrated by previous research, often social and environmental practices are implemented together, so maybe there is a correlation between organizations that develop environmental strategies and the development of social practices.

Because of the inherent and unavoidable attention to the environment by recycling organizations, it is interesting to study whether correlations exist between green organizations and the implementation of socio-environmental practices.

The preceding discussion can be summarized with the following hypothesis:

H5a: There is a positive correlation between organization performance of recycle organizations and the development of social practices.

H5b: There is a positive correlation between organization performance of recycle organizations and the development of environmental practices.

3 Research design

3.1 Context of analysis

European Union has adopted several environmental strategies, with the aim to safeguard the environment and human health. The General Directorate for Environment, that is the European Commission department responsible for EU policy on the environment, controls that EU Member states apply the law correctly. Italy is a European Member from 1952, and has to apply the European law. However, each member state can do it differently according to national features, and can have very different results. One example is the statistical research of Eurostat, which has studied the various municipal waste management in each State.

The picture below is an elaboration of ISPRA (*Istituto Superiore per la Protezione e la Ricerca Ambientale*) basing on Eurostat data and shows the percentage of recycling (marked in green) practices.

The recycling activity, in fact, is considered so important because it is “socially efficient” (D’Amato, 2008), which means that waste management is directly influenced and influenced human activity in turn.

Every state can develop different strategies and reach varying results (ISPRA, 2015). For this reason, this work focuses on one single country, given that national politics and culture undoubtedly influence the business.

3.2 Sample selection and data

To develop a deep analysis of the current situation of the Italian recycling organizations, we have collected quantitative and qualitative data referred to those companies which recycling is the core business.

In fact, a large number of companies implements recycling activity as secondary business.

Organizations within the sample have been selected thanks to a classification code, in particular the US SIC code. This code was chosen because the corresponding Italian code does not give the chance to focus only on the recycling business.

The sample includes 87 Italian organizations which core business is waste recycling. To collect secondary data, it was used the database Amadeus- Bureau van Dijk⁹, triangulated with corporate web site and other sources. In particular, we have chosen the 495 US SIC code that comprehends different activities as Sanitary Services, Refuse System and Hazardous Waste Management. Evidently, the activity of each organization can be diverse. In fact, among all, the computer search was made only for the organizations which core business is recycling. I did not choose just one of this code as the US SIC code 4955 “Hazardous Waste Management” to not focus on one waste type only. To have a complete overview it is important to consider the largest number of companies in the recycling sector, regardless of the type of waste treated. From the European database Amadeus, Italian organizations were selected.

Because the aim of this work is to analyze the business from a business administration point of view, only the organizations of which financial position were dated 2015 were selected. In fact, a comparative analysis can be done only among data of the same year: this time period assumption is necessary.

3.3 Methods of analysis

Once collected data and created the database, we have developed an econometric analysis through ordinary least squares (OLS) to test the first three hypotheses. Furthermore, we have implemented a descriptive analysis, studying the frequencies and the composition of the sample. These kind of analyses are necessary to test the hypotheses number 4 and 5 that refer to qualitative variables.

The collected data relate to the year 2015, and the model utilized for the analysis of these variables is a model of multiple linear regression:

⁹ <https://www.bvdinfo.com/it-it/our-products/company-information/international-products/amadeus>

$$y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni} + \varepsilon_i$$

Where:

- Y_i = Dependent variable, i.e. the performance of Italian retrieval and recycling companies;
- $X_1 \dots X_n$ = Independent variables;
- $\beta_1 \dots \beta_n$ = Regression coefficients;
- ε = Stochastic error.

The quantitative method is a good way to examine the relationship between the economic and the environmental performance (Molina-Azorin et al., 2009), and it fits particularly in this analysis because the object of the study is “green organizations”. As a consequence, a good economic performance means a good recycling activity, which means a good environmental performance, in turn.

3.4 Variables

3.4.1 Dependent variables

A correct evaluation of performance is essential for stakeholders (Gervasio & Montani, 2013). We have decided to measure financial performance through two dependent variables: ROA and EBITDA. ROA, in fact, has been really used in this type of studies that compare environmental management and financial performance (Molina-Azorin et al., 2009).

However, because ROA is a measure of a company’s profitability and it is equal to a fiscal year’s earnings divided by its total assets (Weber et al., 2008), it seems very interesting to compare it with another kind of performance measure, as EBITDA. The latter is a measure of cash flow and because *depreciation and amortization are non-cash expenses, EBITDA is a good way to know how much cash a company is generating – cash that can be used to pay dividends or reinvest in the company* EBITDA is the preferred metric. Furthermore, EBITDA mitigates the distortions to operating income caused by arbitrary asset depreciation schedules (Becker-Blease, et al., 2010).

3.4.2 Independent variables

Age

For the sake of a complete business analysis, it is important to study the organizations’ age. In fact, the relation between age and performance is not that evident, in literature.

On the one hand, ancient organizations have a competitive advantage: the knowhow acquired over time. On the other hand, new organizations can start the business being aware of the most current needs and being less linked to past constraints.

In the literature, the age has often been considered during the assessment of a business (Campa & Kedia, 2002; Villalonga, 2004; Radipere & Dhliwayo, 2014). Firm’s age is measured as years since the foundation.

Size (Number of employees)

The company size is measured by the number of employees as done by previous studies (Kaynak & Kothari, 1984; Mugler & Miesenbock, 1989; Cavusgil & Naor, 1987; Holzmuller & Kasper, 1991), and because using sales as a size measure, it is not considered the best choice because organizations of the sample can manage very different types of waste (as paper or electronic ones) that give rise to totally different sales values.

Innovation (Number of patents)

Innovation is an important aspect of a business. If it is hard to create innovative ideas and practices, is hard to survive. Innovative aspect is particularly important in a dynamic business as the recycling

one. Because waste issue is a very dangerous problem, it seems essential to invest in R&D and try to develop new ideas and practices.

To evaluate the level of innovation of each organization, it is used the number of patents (Ahuja & Katila, 2001¹⁰). *Patents are a meaningful measure of innovation* (Ahuja, 2000).

Net income

Net income is strongly important for the evaluation of a financial performance. The information given by net income is very different from the one given by ROA and EBITDA, because ROA is a relation between income and total asset (and so the asset component is significant) and the EBITDA is not influenced by many relevant value as interest, tax, depreciation and amortization. For this reason, net income is an important variable to add in the model to have a complete overview (Becker-Blease, et al., 2010).

Governance (Shareholder type)

Recycling business is thoroughly interconnected with many public aspects as:

- Healthcare: the impact of waste pollution has effect on lifestyle and citizen health care that can have consequences on public healthcare costs and on life expectancy;
- Government: new law and legislation, continuous update at national and international level to stop the ecosystem contamination;
- Business: organizations must follow the government regulations and new consumer desirability criteria.

The link between the public sector and recycling business is strong and delicate (Folz, 1999). Thus, in order to conduct a deep analysis of this business, it is necessary to study the equity participation by public Authorities, State and Government.

To test the governance of the sample a dummy variable is employed: 1 if public entities are present in the shareholding structures, 0 otherwise.

Area (geographical)

Sustainable values or practices tend to be local because are linked to local communities.

The distribution of the recycling organizations has been studied by differentiating two areas: north and centre-south, in accordance with the following distribution:

- What is meant by north are the companies situated in the following regions: Emilia Romagna; Friuli Venezia Giulia; Liguria; Lombardia; Piemonte; Trentino Alto Adige; Valle d'Aosta and Veneto.
- What is meant by centre-south are the companies situated in the following regions: Lazio; Marche; Toscana; Umbria; Abruzzo; Basilicata; Calabria; Campania; Molise; Puglia; Sardegna and Sicilia.

Current debate and news show that the recycling practices are strongly different between north and south (ISPRA, 2015; L'Italia del riciclo, 2015). For this reason, it seems important to consider the area within the model.

Furthermore, also the analysis made by "Italia del Riciclo" to analyze import and export, has divided Italy between north and center-south.

To test the area, it is created a dummy variable: 1 if the organization has its headquarters in one of the regions cited in the north area, 0 otherwise.

Environmental aspect (ISO 14.001)

¹⁰ Number of patent is a common measure to evaluate the degree of innovation and it is broadly used in literature. Among other see Griliches (1984); Henderson & Cockburn (1996); Katila & Ahuja (2002).

As mentioned above, the recycling business is a green business that means that a good performance has positive effect on the environment. Environmental management can be tested by using the certification ISO 14.001 (Molina-Azorin et al., 2009). The variable ISO 14.001 is used majorly in the more update works (the first one is dated 2006). By “emission” they consider different type of it as: ozone emissions, emissions of toxic chemical, COD emissions, total emissions etc. For this reason, I believe that the certification ISO 14.001 is a modern and efficient variable to measure the environmental management. Furthermore, the variable emission is not considered the best way to measure the economic aspect for this sample because it can take on too different values depending on the type recycling activity done by the organization.

Since the database used, Amedeus, does not give this kind of information, to acquire it, we have checked the web site of every single organization to find out if they have obtained the environmental certification.

As an environmental management variable was created a dummy variable: 1 if the organization is ISO 14001 certificated, 0 otherwise.

Social aspect (Woman presence in the Board of Director as CEO)

Often organizations that implement environmental practices, develop also social practices (Pullman et al., 2009).

Diversity is one of the main points of the Italian D. Lgs 254/2016. This means that organizations should consider it in their policy.

The female presence within the board of director (Isidro & Sobral, 2015) is a way to measure it. For this reason, we believe that it is interesting to study whether there is a correlation between the social attention and the environmental practices. Furthermore, in a green business as the recycling one, this relation can be very relevant. Unfortunately, a large number of organizations does not show all the component members of the Board of Director but only the CEO.

For this reason, we have tested if the Chief Executive Officer (CEO) is a woman, variable that was studied also in the previous research (Oakley, 2000).

Therefore, it was created a dummy variable: 1 if the CEO is a woman, 0 otherwise.

4 Findings

4.1 Descriptive analysis

The sample is composed by 87 Italian organizations involved in the recycling business. They differ in several aspects such governance, area, environmental and social aspects, innovations and size. To implement a descriptive analysis, the software SPSS has been used.

Because the implementation of descriptive analysis differs depending on the qualitative or quantitative nature of the variable, first qualitative variables are studied (that are governance, area, environmental and social aspects, all dummy variables).

Most of the Italian recycling organizations are governed by private entities. In fact, the value 1 was given when, within the shareholder, there is at least one public entity, regardless of whether the majority is public or private: that means that it is stressed just the public presence within the ownership. In the Italian context, we can see that governmental entities do not participate much in the recycling business. This data is very relevant because if we consider the strong impact of waste on human health (Giusti, 2009), it seems important that governmental entities take part of this business. In fact, there are evidences about the dangerous consequence of a bad waste management on human health.

Most of the organizations are located in the north of Italy. This information is not in contrast with the general Italian situation, where most of the organizations are in the north (ISTAT). However, for this

type of business, is important to stress that Region is the competent authority for waste management in Italy (Decreto Ronchi¹¹).

Many recycling organizations have the environmental certification ISO 14001. It seems normal that organizations that are active in a green business, which mission is inevitably based on environmental care, use to obtain even a legal recognition of the respect and attention that they have for the environment. However, data indicate that only about half of the organizations hold the ISO 14001 certification.

Green activities have inevitably social implication. In fact, if the environment is clean and pleasant, lifestyle is higher (Simon, 1965). Furthermore, previous research has demonstrated that most of the time, if an organization is interested to environmental aspect, it pays attention also in social aspect (Turban & Greening, 1997; Waddock & Graves, 1997). Furthermore, considering for example ESG (that means Environmental, Social and Governance) topics, we can notice that environmental and social aspects are used to be consider together as element of sustainability. The presence of woman in the board is certainly an index of social practices (Bear et al., 2010) and it is confirmed also by the GRI standards.

Accordingly, we have analyzed whether organizations that are active in a green business as waste recycling, take care also of social aspect as gender diversity. Because it was impossible to get the name of all the members of the board of director, we have studied the CEO gender. Inevitably, this situation is even more rare and specific, than “just” the presence in the board. From the data, we can see that almost the 20% of the chiefs of the board of director are women.

Organizations in the sample are either large and small, this can be seen by both the maximum number of employees (7.924) and the average number of employees (142).

In general, analyzing the economic data of the sample, 74 organizations out of 87 have a positive ROA; 75 organizations out of 87 have a positive ROE; 81 organizations out of 87 have a positive EBITDA.

Net income, Capital and Cash Flow are consistent with the financial data, and denote that the economic conditions are various in quantity.

The number of patents shows the level of innovation. Just 10 organizations out of 87 have invested in innovation processes. Six organizations have one patent, two have two patents. There are only two companies that have more than five patents.

The tables below summarize the descriptive analysis of the variables used in this study.

< table 1a here >

< table 1b here >

4.2 Hypotheses testing

¹¹ Legislative Decree number 22, February 5, 1997.

Here below is showed the correlation matrix that sheds light on the correlation¹² among all the variables: dependent, independent, control, qualitative and quantitative variables.

< table 2 here >

Some high correlations are justified by an economic *ratio* as the significant correlation between ROE and ROA (.895**) or EBITDA and Cash flow (.999**) or Total assets and number of Employees (.992**) that are two size measures.

To develop OLS models, ROE is not used as dependent variable because, as we can see in table 5.18, it is very correlated with ROA (Pearson correlation is 0,895*). Therefore, it is better to choose ROA and EBITDA as dependent variables for the two different models, because they are not correlated (Pearson correlation is 0,023).

To test the first three hypotheses, we have developed two models: model 1 and 2 comprehend one dependent variable (ROA for model 1 and EBITDA for model 2) and quantitative and qualitative variables.

Within these two models, the quantitative variables are age, size and innovation and are considered as independent variables. Instead, governance, area, social and environmental aspects and net income as control variables.

4.2.1 The ROA model

This section presents the findings regarding ROA as dependent variable.

< table 3 here >

The model summary gives an overview of the three models that express ROA as the performance indicator.

Durbin-Watson confirms that there are no multi-collinearity problems. In fact, the p-value is always < ,05. This result means that in each model there are one or more variables that are statistical significant, and that have effects on the dependent variable. This concept is clear in the coefficients table below.

< table 4 here >

To avoid possible multi-collinearity on the interaction variables in the regression analysis, we have tested the inflation factors values (VIF) on all independent, control and moderator variables to fall below 10 (Hair et al., 2006). These results indicate adequate OLS regression.

¹² Pearson correlation

4.2.2 The EBITDA model

This section analyzes the same relations and thus the same model but using a different economic performance variable: EBITDA. In fact, considering a different measure of performance, we can have different results. The same process developed above is here exposed using EBITDA as dependent variable.

< table 5 here >

The model summary gives an overview of the model that use EBITDA as the performance indicator. Durbin-Watson confirms that there are no multi-collinearity problems. Furthermore, the p-value is always $< ,00$ means that there are one or more variables that are statistical significant, and so that have effects on the dependent variable.

The value of the R square is very high, confirming that the model is statistically significant.

< table 6 here >

Also for EBITDA models I have tested if the inflation factors values (VIF) on all independent, control and moderator variables fall below 10 (Hair et al 2006), indicating that there are no multi-collinearity problems.

Model 4 tests the linear regression of EBITDA and independent and control variables.

5 Discussion and conclusions

5.1 Theoretical implications

The empirical analysis of this work examines the organizations active within the recycling business in Italy, testing five hypotheses on a sample of 87 organizations operating in the recycle business. Most of the organizations are located in the northern area and are considered small organizations (with from 5 to 50 employees). Public entities are not very relevant within the shareholding (87% of the sample is totally owned by private entities).

Most of the organizations are ISO 14001 environmentally certified and this aspect is relevant considering that the object of the study is organizations active within a green business.

Although it is a young business (most of the companies were established between 1990 and 2010, and in particular at the beginning of the 21st century), it is not very innovative. In fact, just 11,5% of the companies have invested on patents, and most of them have only one patent.

Economic data show positive economic performance. Looking at the correlation table, it is possible to notice that the performance variables are related with some other economic variables that are an expression of business aspects. For example, EBITDA is correlated with cash flow (.999**) and working capital (.912**), ROA with ROE (.895**). In fact, those correlations are caused by economic factors.

Referring to the ROA model, the economic performance is influenced only by age and net income (Pearson Correlation = .225*). Therefore, age is positively and significantly related to an organization's performance in this particular business. This means that the older the organization, the better the economic performance in line with suggestions of previous studies (Levitt & March, 1988; Argote et al., 2003; Brynjolfsson et al., 2011).

However, if EBITDA is considered the measure of profitability, organization age does not have impact on the recycling business performance. In fact, for example, new organizations can be more compliant with current needs because they can build their own business *ex novo* and direct activities according to the market preferences.

In summary ROA is positively associated with organization age (p -value = .083¹³) and the correlation is significant at the 0.05 level (Pearson correlation = .225*). Instead EBITDA is not correlated with organization age (the p -value of size in the EBITDA model is .270 and Pearson correlation is not significant).

Important economic features of the profitability variables can explain this different impact. In fact, considering ROA as the performance indicator means that amortizations are included in the analysis. So, the older a company the higher the ROA. This can occur because generally, old organizations have already amortized the investments: the earlier the asset was bought, the earlier it is amortized. This consideration is very true in the case of assets with a long lifecycle, as are those used in the recycling industry. But the correlation is also a measure of innovation and investment shortages because it shows that old organizations do not buy or invest in new assets, since once they have amortized the necessary assets bought at the beginning, seemingly they are no longer interested in investing in new assets.

ROA is definitely not correlated with an organization's size. In fact, the p -value is .716 and the Pearson correlation is not significant. Furthermore, because ROA gives information about the capital intensity of an organization, it is logical that it is not related to the number of employees (labor intensive), which have been chosen as a measure of the size in this work.

Referring to the EBITDA model it seems that economic performance is influenced only by organization size ($p < .1$). Therefore, organization EBITDA is positively associated with size. This result suggests that large recycling organizations are more efficient in generating cash than their assets are in generating profit. The fact that two models using different dependent variables, do not give the same results is normal. For example, Artz et al (2010), measuring organization performance using ROA and sales growth, find that firm size is not related to sales growth.

¹³ Is possible to consider significant p -value $< 0,1$ because the sample is small, under 100 companies.

Because we cannot identify which variable between ROA and EBITDA is better to measure the performance of the organizations, we can claim that the ability of recycling organizations to generate cash is positively associated with organization size.

Another important element coming from this study is that innovation is not significant in ROA or EBITDA model. It can be explained by the fact that many patents provide limited protection (Griliches et al., 1991). The variable innovation confirms the lack of creativity in the recycling business. Besides the fact that the variable is not correlated with any of the two performance variables, only 10 organizations out of 87 invest in new patents.

From a statistical point of view, this data is not so significant because the variable innovation can be considered statistically as a dummy variable, as almost the 90% of the sample does not have patents. But this is the main point: in a business that should be investing in R&D to confront a current issue that is and will become more and more important in terms of human healthcare, politics, and the law, most of the companies, even though at present in good economic shape, do not invest in the future. Within the recycling business, organizational performance is not associated with an organization's degree of innovation.

The correlation table and previous research show that institutional shareholdings are likely to depend on company size (Himmelberg et al., 1999).

There are no unanimous views on the relationship with the profitability. Referring to the EBITDA models the public entities within the shareholders ($p < .1$) is positively and significantly related to organization performance. This means that the more the shareholders are influenced by public entities, the better the economic performance (the Correlation table shows that governance is positive and significantly correlated with EBITDA: Pearson correlation = ,348**, p -value = .001). Instead, public influence in the shareholding does not affect the ROA (Pearson correlation = -,075, p -value = .491).

Within the recycling business this aspect is particular important. It was previously said that waste management can affect human health and, because of that, public shareholders should be both particularly involved in this kind of activity and careful about the performance of recycling companies.

The fact that the presence of public authorities in the shareholding structures of Italian recycling organizations influences EBITDA, and so the ability to generate cash, is really important, first, because cash information is useful for enterprise performance evaluation (Saracino, 2007), second because cash can be used to reinvest (Becker-Blease, et al., 2010) in order to continue or improve the activity.

Moreover, it is noted that both ROA and EBITDA are influenced neither by environmental practices nor by their level of social attentiveness ($p > .1$). Therefore, implementing social and environmental practices in a green business, does not allow the achievement of positive economic results. Alternatively, it can be stated that good environmental and social practices do not result in the performance indicators.

However, previous research shows that CSR helps organizations to achieve competitive advantages and a high level of financial performance (McWilliams & Siegel, 2000; Wagner, 2011). As a consequence, this assertion supports the thesis that CSR is an important aspect to consider during a business evaluation. Within the Italian recycling business, there is no evidence of a relation between economic performance and CSR.

To sum up, we can affirm that while hypothesis 3 and hypothesis 5 are clearly rejected, hypothesis 1, 2 and 4 can be partially accepted as one of the two dependent variables were significantly and positively related to the independent variable.

5.2 Practical and policy implications

This work also provides practical implications. Older organizations demonstrate better economic results because of 'learning by doing' (Arrow, 1971) and because the types of assets used in the business are principally long lifecycle machinery. This suggests that in a sector of this kind it could

be better to restore old organizations than to start new ones. This is also because the sector is not so innovative in terms of patents and therefore it is reasonable to infer that the need to enhance performance and efficiency of existing businesses could be considered higher than the need of stimulating the rise of new start-ups.

Moreover, the ability of the Italian recycling organizations to generate cash is positively correlated with size. These two findings can be considered together. In fact, the statistical analysis suggests that good economic performance is achieved by large and old organizations, and so, in order to reach such a result, mergers and acquisitions, incorporation or joint ventures could be recommended. We have also seen that the presence of public entities among the shareholders is positively and significantly correlated with EBITDA, but in particular it is correlated with the organization's size. Therefore, the study suggests that public participation is desirable in this business, for both economic and health reasons.

To conclude, this work has policy implications. Findings suggest that for an efficient recycling activity the Italian business should be composed of large and old organizations where the public authorities are involved. Policy makers should consider these findings to promote laws regarding the recycle business.

5.3 Limitations and future research

Certainly, the study suffers from some limitations. The fact that the empirical analysis has been conducted in a national context, namely the Italian one, means that the results cannot be generalized and applied to other states although they can be useful for comparisons. Moreover, reliance was placed exclusively on results from one financial year, which was negatively influenced by the current financial crisis. Furthermore, exclusive reliance was placed on the data available from the Amadeus database. It could be interesting to outline some possible future research on this topic. First, the same analysis can be applied to each of the green businesses. In fact, it would be interesting to see whether there are elements in common among the various green businesses. Second, taking into account the Green business classification, future research could analyze the presence of the green practices identified in the second chapter in order to study a possible correlation between green practices and green businesses.

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Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
ROA	87	-30.822	14.743	1.55899	5.857640
ROE	87	-88	48	5.56	17.988
EBITDA	87	-1027505*	116503139*	2723404.51*	12878754.833
Aging	87	3.00	52.00	20.7931	10.12726
Size	87	1	7924	142.24	847.120
Governance	87	0	1	-	.334
Area	87	0	1	-	.470
Innovation	87	0	8	.26	1.062
Environmental aspect	87	0	1	-	.501
Social aspect	87	0	1	-	.399
Net income	87	-2428023*	9436082*	272738.15*	1194812.342
Capital	87	7743*	182436916*	3854474.92*	20266635.593
Cash flow	87	-795912*	82917253*	2000769.83*	9234814.961
*Data in Euro					

Table 1a. Descriptive statistics

Governance				
		Frequency	Percent (%)	Valid Percent (%)
Valid	No public entities (0)	76	87,4	87,4
	Public entities (1)	11	12,6	12,6
	Total	87	100,0	100,0
ISO 14001				
		Frequency	Percent (%)	Valid Percent (%)
Valid	No certification (0)	40	46,0	46,0
	ISO 14001 (1)	47	54,0	54,0
	Total	87	100,0	100,0
Gender diversity				
		Frequency	Percent (%)	Valid Percent (%)
Valid	Male (0)	70	80,5	80,5
	Female (1)	17	19,5	19,5
	Total	87	100,0	100,0

Table 1b. Descriptive statistics of qualitative data

		Correlations												
		ROA	ROE	EBITDA	Aging	Size	Innovation	Governance	Area	Environmental aspect	Social aspect	Net income	Working capital	Cash flow
ROA	Pearson correlation	1	,895**	.023	,225*	-.019	-.004	-.075	-.016	.136	.128	.026	.031	.031
	Sig. (2-tailed)		.000	.832	.036	.859	.969	.491	.886	.209	.238	.810	.777	.777
ROE	Pearson correlation	,895**	1	.006	.165	-.027	.024	-.062	-.002	.103	.100	.010	.014	.014
	Sig. (2-tailed)	.000		.960	.126	.807	.825	.571	.983	.344	.359	.924	.896	.896
EBITDA	Pearson correlation	.023	.006	1	.105	,964**	-.039	,348**	-.130	-.065	-.060	,912**	,999**	,999**
	Sig. (2-tailed)	.832	.960		.332	.000	.719	.001	.232	.552	.582	.000	.000	.000
Aging	Pearson correlation	,225*	.165	.105	1	.124	-.100	-.136	-.119	.116	.059	.075	.106	.106
	Sig. (2-tailed)	.036	.126	.332		.253	.358	.208	.271	.284	.587	.490	.328	.328
Size	Pearson correlation	-.019	-.027	,964**	.124	1	-.033	,297**	-.154	-.094	-.063	,908**	,957**	,957**
	Sig. (2-tailed)	.859	.807	.000	.253		.762	.005	.153	.385	.565	.000	.000	.000
Innovation	Pearson correlation	-.004	.024	-.039	-.1	-.033	1	-.095	.079	-.053	-.069	.003	-.039	-.039
	Sig. (2-tailed)	.969	.825	.719	.358	.762		.380	.465	.626	.528	.813	.975	.717
Governance	Pearson correlation	-.075	-.062	,348**	-.136	,297**	-.095	1	-.108	.004	-.100	.118	,307**	,358**
	Sig. (2-tailed)	.491	.571	.001	.208	.005	.380		.319	.971	.356	.276	.004	.001
Area	Pearson correlation	-.016	-.002	-.130	-.119	-.154	.079	-.108	1	-.043	.029	.037	-.199	-.130
	Sig. (2-tailed)	.886	.983	.232	.271	.153	.465	.319		.692	.788	.733	.065	.231
Environmental aspect	Pearson correlation	.136	.103	-.065	.116	-.094	-.053	.004	-.043	1	-.069	.152	-.101	-.064
	Sig. (2-tailed)	.209	.344	.552	.284	.385	.626	.971	.692		.526	.159	.351	.555
Social aspect	Pearson correlation	.128	.100	-.060	.059	-.063	-.069	-.100	.029	-.069	1	.046	.014	-.059
	Sig. (2-tailed)	.238	.359	.582	.587	.565	.528	.356	.788	.526		.673	.897	.590
Net income	Pearson correlation	,405**	,330**	.131	.027	-.103	-.026	.118	.037	.152	.046	1	.056	.158

	Sig. (2-tailed)	.000	.002	.226	.804	.343	.813	.276	.733	.159	.673		.608	.145
Working capital	Pearson correlation	.026	.010	.912**	.075	.908**	.003	.307**	-.199	-.101	.014	.056	1	.911**
	Sig. (2-tailed)	.810	.924	.000	.490	.000	.975	.004	.065	.351	.897	.608		.000
Cash flow	Pearson correlation	.031	.014	.999**	.106	.957**	-.039	.358**	-.130	-.064	-.059	.158	.911**	1
	Sig. (2-tailed)	.777	.896	.000	.328	.000	.717	.001	.231	.555	.590	.145	.000	
**. Correlation is significant at the 0.01 level (2-tailed).														
*. Correlation is significant at the 0.05 level (2-tailed).														

Table 2. Correlation table

ROA Model Summary							
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	F	P-value
1	.482	.232	.154	5,388474	2,529	2,953	0,006
Dependent Variable: ROA							

Table 3. ROE models Summary

Coefficients								
Model		Unstandardized Coefficients		Standardized Coefficients	t	P-value	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-1,604	1,851		-.866	.389		
	Aging	.106	.060	.183	1,759	.083	.907	1,102
	Size	.000	.001	.040	.366	.716	.843	1,186
	Governance	-1,728	1,903	-.099	-.908	.367	.834	1,199
	Area	-.193	1,268	-.015	-.152	.879	.952	1,051
	Innovation	.153	.557	.028	.274	.785	.967	1,034
	Environmental aspect	.761	1,194	.065	.637	.526	.943	1,060
	Social aspect	1,438	1,480	.098	.972	.334	.970	1,031
	Net income	.000	.000	.403	3,933	.000	.938	1,066

Table 4. Coefficients ROA models

EBITDA Model Summary							
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	F	P- value
2	,992	,985	,983	1668697,748	2,196	630,576	,000
Dependent Variable: EBITDA							

Table 5. EBITDA models Summary

Coefficients								
Model		Unstandardized Coefficients		Standardized Coeff.	t	P-value.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
2	(Constant)	53805,972	573309,361		,094	,925		
	Aging	-20723,789	18655,342	-,016	-1,111	,270	,907	1,102
	Size	14943,940	231,360	,983	64,592	,000	,843	1,186
	Governance	1079580,232	589387,035	,028	1,832	,071	,834	1,199
	Area	405409,583	392536,564	,015	1,033	,305	,952	1,051
	Innovation	-19943,519	172337,028	-,002	-,116	,908	,967	1,034
	Environmental aspect	-127956,529	369665,091	-,005	-,346	,730	,943	1,060
	Social aspect	-194267,571	458194,174	-,006	-,424	,673	,970	1,031
	Net income	2,478	,156	,230	15,934	,000	,938	1,066

Table 6. Coefficients EBITDA models