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Classification and Measurement of the Firms' Resources and Capabilities Applied to Eco-Innovation Projects from a Resource-Based View Perspective

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Abstract: Interest from academics, policy–makers and practitioners in eco-innovation has increased as it enables the optimization of the use of natural resources improving competitiveness and it provides a conceptual framework for corporate sustainability. In this context, this paper provides an in-depth analysis and a wide classification of the specific indicators for the integrated measurement of eco-innovation projects in business from a resource-based view (RBV). The specific metrics were tested to measure the economic-financial and environmental resources and capabilities applied by five Spanish firms to eco-innovation projects, selected as case studies.

Keywords: eco-innovation; resource-based view; environmental management accounting; project management control; corporate finance; circular economy

1. Introduction

In recent years, a growing number of studies have been undertaken to analyse eco-innovation projects and those aspects linked to the exploitation of natural resources and the reduction of the ecological footprint of industrial production [1–3]. The term eco-innovation is commonly associated with the development of new ecological products, the consumption of renewable or more sustainable sources and the reduction of waste through technological innovation based on or pursuing eco-efficiency [4], which was derived from the search for an increase in competitiveness through environmental improvement [5]. In fact, the increasing importance of environmental issues for companies can be driven through eco-innovation, generating competitive advantages [6] and, ultimately, economic and environmental efficiency [7].

Nevertheless, eco-innovation remains difficult to implement in business [8] and how firms might manage it to gain a competitive advantage is still under discussion among academics [9], as eco-innovation attempts to obtain overall improvements in economic performance and environmental areas simultaneously, in the transition to new business models such as the circular economy [10]. Despite the fact that corporate management plays an important role to accelerating eco-innovation [11] in many European countries, eco-innovation projects are not common in industries due to significant barriers and a negligible culture of excluding eco-innovation from an organization's strategy [12]. Thus, to elucidate external and internal factors that can encourage companies to invest more in eco-innovation projects can explain part of the main dilemma of achieving equilibrium between economic and environmental efficiency in business [13].

In the last decade, external factors such as regulation, barriers and drivers for eco-innovation in firms have been analysed [14–21], within the theoretical framework of institutional theory [22,23] or stakeholder theory [24–26].

Internal business factors, such as resources and capabilities related to eco-innovation have also been analysed within the resources-based view (RBV) [8,27–33] to understand the systemic process of eco-innovation. However, these contributions only provide fragmented evidence of some of the resources needed for such projects, and resources applied to eco-innovation by business are sometimes measured in tangents with capabilities without a thorough explanation of how they complement one another.

To the best of our knowledge, the debate on the specificity of the applied resources and their integrated measurement for eco-innovation is still ongoing [34,35] because there are a limited number of studies specifically measuring the wide types of resources applied by companies to eco-innovation and the output generated by these investments. Resources, capabilities and eco-innovation outcomes have been addressed in the literature but they have not been analysed and combined in the same integrated measurement framework.

Based on these premises, the main objective of this study is to define, classify and measure the specific resources and capabilities applied to the eco-innovation investments by the firms in order to provide an integrated measurement of eco-innovation and to analyse the influence of businesses' financial and environmental resources and capabilities in the eco-innovation projects.

In this context, as the internal factors of companies are affected, their active collaboration in classifying and measuring the specific resources and capabilities that are applied to perform investments in eco-innovation is required. Thus, a qualitative analysis of five case studies of eco-innovation projects in manufacturing firms in Spain was carried out to test the endogenous inputs (resources and capabilities) used when investing in eco-innovation and the interrelations with the obtained outcomes.

In summary, the definition, classification and application of integrated indicators represents one of the contributions of this study to analyse the relevance of the specific economic-financial and environmental resources and capabilities available for eco-innovation in firms which has remained relatively unexplored in the eco-innovation literature in the framework of RBV. The development of these metrics has not been achieved in previous studies in this field to the same degree of specificity and range, differentiating the resources of the capabilities and of the obtained results, being in turn classified among those that primarily refer to the economic factors of the environmental ones.

In this paper, after the introduction, a review of the literature and the study background are summarized to identify the gap in the knowledge of the RBV. The applied methodology and the analyses of the cases are described in a specific section that introduces the obtained results. Finally, in the conclusion, a brief discussion is provided to summarize the principal results obtained in this study and to suggest future lines of research.

2. Background

Although the literature on the interrelated subjects, eco-innovation, project management and RBV, is too vast to be cited in this paper, it is important to highlight the principal authors of interest to in this field.

Eco-innovation has systemic conditions and is generally developed in a fast-changing environment that has fomented an ongoing debate in the literature based on different theoretical positions about the internal factors that allows for the competitive improvement of companies that carry out eco-innovative investments. The seminal contribution of Penrose [36], who considered that firms needed to organize their resources and capabilities in order to become more competitive, was followed by Barney [37,38] and other authors that have endorsed the RBV as a valid theoretical framework from which to undertake analyses of the resources and capabilities necessary for eco-innovation [22,28,29,39–41]. Nevertheless, some authors, such as Priem and Butler [42], have discussed whether the RBV theory provides additional insight over traditional organizations' understandings. Although several authors have advocated the value of the RBV [38,43–45], the debate is still open [46].

In this field, the implementation of environmental management systems has been widely analysed [41,47–50], as well as the implementation of certifications such as the ISO 14001 or EMAS [14,51] because they are considered resources and capabilities related to the environmental performance of firms. The technological capabilities for R&D and the link between eco-innovation and competitiveness has also been also studied [48,52–54].

Some authors have analysed the organizational resources that firms strategically use for innovation [55–57]. Financial resources, access to capital and the availability of public funds for the environmental improvement of a firm have been also analysed [25,29,58,59], as well as the size of the firms that has often been considered as a necessary resource for innovation [18,60–62]. However, it can be stated that there is a tendency in the literature to apply the RBV without differentiating between the resources and the capabilities of firms in empirical analyses of eco-innovation [8,27,29–32, 63].

Taking another approach, it has been demonstrated that environmental R&D investment or internal R&D activity facilitate eco-innovation in business [40,59,64–66] and both have been related to patent registration and ongoing innovation activity [2,22,67]. Human resources [68–70], knowledge for innovation [71] and intellectual capital have been included among resources for eco-innovation as partial replacements for raw material input and human capital [29,72–74].

In summary, the capabilities that are traditionally indicated for eco-innovation processes are age [75], experience and the know-how associated with 'routine' firm activities [76–81]; this is the case for internally or for externally developed knowledge [82]. In this sense, Muller et al. [83] noted that the ability of firms to combine several process innovations (productive efficiency) or to produce different innovative products is relevant when developing eco-innovations [84,85], as is their ability to anticipate regulation changes [86].Technological and dynamic capabilities have been studied by several authors [87–93], as well as the capabilities related to businesses' environmental proactivity [94]. Furthermore, the leadership for environmental changes [74,95] and the attitude of management towards the environment and CSR have been considered of interest [28,96–99] because they allow for an organization to align itself with changes in its natural and business environments and to combine external information with the organization's internal knowledge [100].

Collaborative capabilities have been considered significant by several authors; because of these capabilities, firms actively collaborate with research institutes, agencies and universities; participate in networks; or collaborate with all agents of the value chain. Additionally, these collaborative capabilities can mean that organizations gain a significant advantage in eco-innovation and a greater ability to absorb external knowledge sources for innovation is also a result [1,2,28,88,100–109].

Based on these premises, our main research question concerned the differentiation and the specific measurement of resources and capabilities mainly applied to the eco-innovation project management and to classify them into two, as summarized in the following matrix (Table 1). It is important to point out that the available data regarding how strategic resources are allocated in firms for investment in eco-innovation are scarce [40]. For this reason, data on the investment, profitability and the economic-financial resources of eco-innovative companies are one of the contributions of this paper.

Table 1. Definition of resources, capabilities and outcomes for eco-innovation projects.

	Resources of Firms	Capabilities of Firms	Eco-Innovation Project Outcomes
Economic-financial Characteristics of Innovation	RF—Financial resources of firms	CF—Innovation capabilities of firms	PF—Investment cost/benefit outcomes of projects
Environmental Aspects of Eco-innovation	RE—Environmental resources of firms	CE—Environmental capabilities of firms	PE—Environmental improvement outcomes of projects

Regarding organizational capabilities for eco-innovation, the definition of Penrose [36] has been adopted, according to which capabilities are unique combinations of organizational processes that collate strategic knowledge and lead to better firm performance [110]. This definition addresses the idea that competitive advantage not only arises from the possession of resources but also from the manner in which resources are used. After defining the primary resources of the firm and its capabilities for eco-innovation investment projects, a qualitative methodology was developed for the holistic analysis of the eco-innovation conducted by firms. This analysis is described in the following sections.

One of the major criticisms of RBV revolves around its lack of practical solutions and their testing at the empirical level. Among the serious drawbacks for empirical testing is the complexity of the RBV concepts [111]. Considering that the literature at its early stage distinguished between resources and capabilities as potential sources of a firms' competitive advantage [111], the integrated measurement of internal factors applied to eco-innovation, focused on their measurement and control can be useful for the decision-making process. Thus, the selected metrics were tested to measure economic-financial and environmental resources and capabilities applied by five Spanish firms to eco-innovation projects, selected as case studies and described in the following section.

3. Materials and Methods

3.1. Selection of the Methodological Approach

There is no doubt that interesting results have been achieved in numerous quantitative and econometric studies that aimed to determine the resources required and capabilities for eco-innovation [9,112].

Nevertheless, empirical studies based on quantitative analysis have some limitations because statistical data, whether national or European, do not provide sufficient detail on environmental orientation or investments made by firms. Eco-innovation project management involves a complex set of factors and processes. In this context, the qualitative analysis has been applied for the study of eco-innovation per other authors [113–120] provides insight into project management and allows for theoretical conceptualization in a field that is still growing [121–126].

The qualitative research was performed in the following phases:

- Phase (I): Definition of the matrix for variable selection
- Phase (II): Data collection, measurement and classification
- Phase (III): Cross-tabulation analysis: analysis using pivot tables to determine the most frequent situations in the five case studies
- Phase (IV): Integrated qualitative analysis

As a result of the literature review, in phase I the most relevant firm resources and capabilities applied to eco-innovation were defined, separating the economic-financial capabilities needed for any innovation process from the specific capabilities that are directly linked to environmental improvements that are intrinsic to eco-innovation projects and their outcomes, as detailed in the Tables 3–5. In order to maintain a proportion in the matrix, the most relevant indicators related to eco-innovation projects were analysed, refined and classified. A total of 30 variables were distributed into three analysis areas (ten variables for each category of indicators: resources, capabilities and project results) according to their typology, economic-financial or environmental (five in each one).

The matrix of indicators was tested in the selected five case studies that enabled to the development of an applied formulation of the qualitative analysis described in the following section.

3.2. Case Studies

The selection of case studies considered appropriate for this research was carried out within the framework of a collaborative project for the promotion of business eco-innovation in a Spanish region. Next, a complete information for the selected case studies was available both for the firms in where the projects were conducted and for the investments in eco-innovation made were offered.

3.2.1. BSH Electrodomésticos España

- Appliances Industry: 5074 employees.

The project was the eco-design of a new fastening system for one of the primary parts of the company's washing machine models. This was able to produce a reduction in product weight and in the amount of material required for its manufacturing, which implied74% reduction of the environmental impact of the specific component. This was a short-term project with a low investment level.

3.2.2. General Motors España

- Automotive Industry: 6230 employees.

This firm carried out the design of a new primary painting and finishing process for automobiles using the resource saving principles. The project allowed for an important reduction in the amount of paint applied per product unit and a reduction in the solvents (149,000 L of paint and solvents per year), the power saved for the process was 4680 MWh/year and a significant reduction in process waste was also achieved with also an interesting and significant incensement in paint quality. This was a mid-term project with a low investment level (considering the total assets of the company).

3.2.3. MAC PUAR

- Elevator Industry: 533 employees

This firm carried out an eco-design project for a new lift model, using the Life Cycle Analysis (LCA) methodology. The new product obtained a relevant energy saving during the use of the lift (40% less than previous models), a reduction in the use of raw materials in the manufacturing process (20% less than previous models) as well as a reduction in the product's weight. This was a mid-term project with a low investment level.

3.2.4. Mondo Tufting

- Other Manufacturing: 81 employees.

The R&D department of this company designed a new specific process for the recovery and recycling of artificial grass products in sporting pitches at the end of their use life. The new manufacturing process offers the possibility of reducing raw materials by recycling plastic materials and a decrease of 90% in the environmental impact of the product's life cycle. This was a short-term project with a low investment level.

3.2.5. SAICA

- Paper Industry: 1573 employees.

This company installed a new energy recovery plant using its own waste and plastic waste as fuel. The new energy plant allowed a reduction in the environmental impact of the waste management process, in the waste energy use and the generation of renewable energy for the primary plant use.

This project implies a decrease of 520,000 t/year of CO_{2e} approx. in the company's production line. This was a long-term project with a high investment level.

3.3. Data Collection and Methodology

The selected firms provided detailed information on their eco-innovation projects during a public workshop that was collected using a specific form and brief semi-structured interviews that were answered by managers of the firms, conducted to obtain detailed information on the eco-innovation projects that could not be addressed using other available sources. The outline of the data collection and the brief interviews is detailed in Appendix B. Moreover, financial-economic data of the companies were collected from the SABI database and supplemented by complementary information obtained from other available public sources, such as CSR reports and other documents. The data sources are detailed in Table 2.

Table 2. Sources of the data obtained from the case studies for each area of analysis.

Data Sources	Resources of Firms	Capabilities of Firms	Eco-Innovation Outcomes
Economic-financial Characteristics	Economic-financial settings database	Semi-structured interviews	Project data 'sheets' and public presentations
Environmental Aspects	Questionnaires and other sources		

The set of indicators elaborated to measure the main resources of firms needed for eco-innovation projects are listed in the Table 3.

Table 3. Variables considered when measuring the resources of firms applied to the eco-innovation projects and the authors who have studied these variables in other studies in the environmental management field.

	Variables	Authors
Economic-financial Resources *	RF_SIZE = Size of the firms	[2,12,41,54,60,109,121–125]
	RF_LIAB = Debt structure of the firms—LIAB_ST	[40]
	RF_LRV = leverage ratio of the firms—LRV	[12,40,126,127]
	RF_ROE = ROE of the firms	[12,29,126,127]
	RF_CR = Liquidity ratio of the firms	[124]
Environmental Resources	RE_RHDIR = managerial staff for eco-innovation (Departments: environmental management, innovation, resources management)	[128,129]
	RE_RH = HIGH intensity of human resources devoted to eco-innovation related activities (% of human resources available in the departments of environmental management, innovation and resources management)	[2,29,59,74,109,130]
	RE_INV = Level of investment in environmental R&D (% of the total investment in R&D)	[40,64,110]
	RE_GRANT = Public subsidies and grants received by the firms for environmental R&D investments	[2,31,100,110,125,131]
	RE_GP = Green patents registered by the firms	[50,108,130,132–134]

As it can be observed, tangible and intangible resources were taken into consideration [27] and the economic-financial resources that are needed to achieved the environmental improvements of eco-innovation were detailed.

The following table shows the indicators to measure the capabilities of the firms in relation to eco-innovation and the main authors who analysed these variables in other studies in the environmental management field (Table 4).

The indicators selected to measure the eco-innovation project outcomes are summarized in Table 5 below.

Some of the proposed variables have been widely analysed in previous studies to date but the economic outcomes of eco-innovation projects have been analysed by a limited number of studies due to the difficulty of obtaining data on investments made by firms.

At the end of the data collection phase, the obtained information was depurated and classified in order to define the level of the firms' resources and capabilities available for eco-innovation projects. The complete formulation of the selected variables is detailed in the Appendix A. A double qualitative analysis was carried out using both, the dichotomy formula and the three-level classification of the obtained data.

This process enabled the development of a matrix in where the variables were distributed into three analytical areas according to their economic-financial or environmental typology: resources, capabilities and project results.

Table 4. Variables used to measure the capabilities of firms, their eco-innovation projects and the authors who have studied these variables in other studies in the environmental management field.

	Variables	Authors
Innovation Capabilities	CF_STRA—Capability to align the business strategy with the regional policy for eco-innovation (strategy)	[135]
	CF_AGE—Age of the firm	[105,121]
	CF_REG—Firms' capabilities to overcome legislation barriers	[136]
	CF_MANAG—Managerial capabilities and leadership for eco-innovation	[74,128,137,138]
	CF_COL—Capability to collaborate for environmental R&D and public/private communication for eco-innovation	[47,64,128,135,139,140]
Environmental Capabilities	CE_INTENS—Eco-innovation activity intensity	[97,141–143]
	CE_SCOPE—Technological capabilities to achieve the scope of the eco-innovation projects	[141,143]
	CE_ENVS—Advanced environmental management systems' implementation	[41,50,109,141,144]
	CE_QUAL—Environmental quality standards	[2,31,51,64,135,144,145]
	CE_CSR—RSC, reporting and environmental accounting	[25,31,32,41]

Table 5. Variables for measuring the projects' outcomes and some of the authors who have analysed these variables.

	Variables	Authors
Economic-financial Outcomes	PF_PROFIT—Profitability index = net present value/investment of the project	[72]
	PF_IRR—Internal rate return of the investment project	[72,144,146]
	PF_INV—Level of investment (% project investment/total assets)	[12,144]
	PF_TIME—Time frame of the project	[12,144,147]
	PF_PB—Pay back of the investment	[144,146]
Environmental Outcomes	PE_RRM—Decrease in resources/raw materials obtained through the eco-innovation project	[100,110,124,125,128,142,148–155]
	PE_RW—Decrease/recovery of waste obtained through the eco-innovation project	[64,97,119,124,125,156]
	PE_EMIS—Reduction in emissions obtained through the eco-innovation project	[125,128,142,149,151,152,156,157]
	PE_REPL—Replacement of materials/resources through the eco-innovation project	[64,124,128,153,156,158]
	PR_ECOD—Eco-design for environmental improvements in the phase of use or end of life	[63,148,159,160]

4. Main Results

Cross-tabulations were developed to detect differences among the five study cases (For reasons of confidentiality, these are detailed randomly and do not coincide with the alphabetical order used in Table 4). The initial results presented in Table 6 indicated some differences, which were not significant of the typologies of resources. Case 5 presented the highest level of financial resources (FR), followed by Case 3 and Case 1. Although this pattern was maintained in general terms for environmental resources (ER), Case 2 was ahead of Case 1 for these types of resources.

Table 6. Qualitative measurement of firms' resources for the eco-innovation projects in the studied cases.

RESOURCES	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5
RF_SIZE	High	Medium	High	High	High
RF_LIAB	High	Low	High	Low	Medium
RF_LRV	High	Low	Low	Low	High
RF_ROE	Low	Low	High	High	High
RF_CR	Low	Low	Low	Low	Low
RE_RHDIR	High	Medium	High	High	High
RE_RH	Low	High	Low	Low	Medium
RE_INV	High	Medium	Medium	High	Medium
RE_GRANT	Low	Medium	Medium	Low	High
RE_GP	Low	Low	High	Low	Low

In terms of economic and structural capabilities (FC), Cases 4 and 5 were at the top level, followed by Case 1 and 2, although nearly all cases exhibited a similar level of capabilities. The order was slightly different in environmental capabilities (EC), as Cases 1, 3 and 4 exhibited a higher level, with a greater difference being noted with regard to Cases 5 and 2, as can be observed in Table 7.

Table 7. Qualitative measurement of firms' capabilities for the eco-innovation projects in the studied cases.

CAPABILITIES	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5
CF_STRA	High	High	Medium	High	High
CF_AGE	Medium	Medium	Medium	High	Medium
CF_REG	High	High	Medium	High	High
CF_MANAG	High	High	High	High	High
CF_COL	Medium	Medium	High	Medium	High
CE_INTENS	High	Medium	High	High	Medium
CE_SCOPE	High	Medium	High	High	Medium
CE_ENVS	High	Low	High	High	Medium
CE_QUAL	High	Low	Medium	Medium	Low
CE_CSR	Medium	Low	High	Medium	Medium

The heterogeneity of the resources available for the five projects did not allow for the identification of clear patterns of combinations of resources and capabilities. The low liquidity indexes (below average for the sector) were common to all cases. Technological and environmental management (environmental standards and CSR) had higher levels in larger firms, in where the three executive positions were linked to the implementation of eco-innovative projects in firms (directors of the departments: environmental management, energy and resources management and the R&D or innovation management). It should be noted that the studied firms had a low level of human resources dedicated specifically to eco-innovation.

Analysing the results obtained in these projects, in general terms, the highest values were identified in Case 4, followed by Case 5 and Case 1. When the nature of these results is analysed, the ranking is altered for the environmental outcomes. Thus, Case 4 as in first position, then Case 2 and followed by Case 5, as seen in Figure 1.

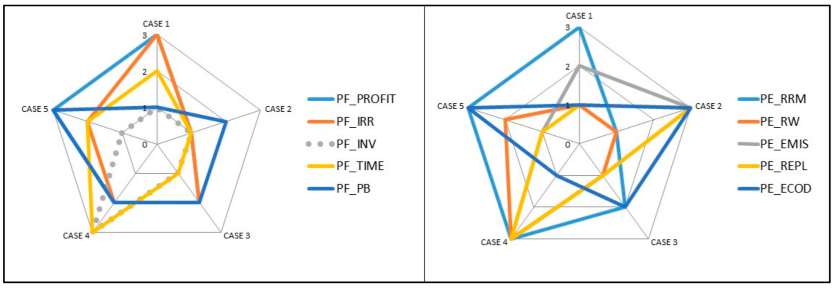

Figure 1. Comparative level of projects' outcomes for economic-financial and environmental variables in studied cases.

If the level of available resources and capabilities of the firms was compared with the projects' outcomes in each case study, it can be observed that these levels were coherent with the projects' outcomes in three of the five cases and, in general terms, the level of the firms' capabilities was higher than the obtained results (Figure 2).

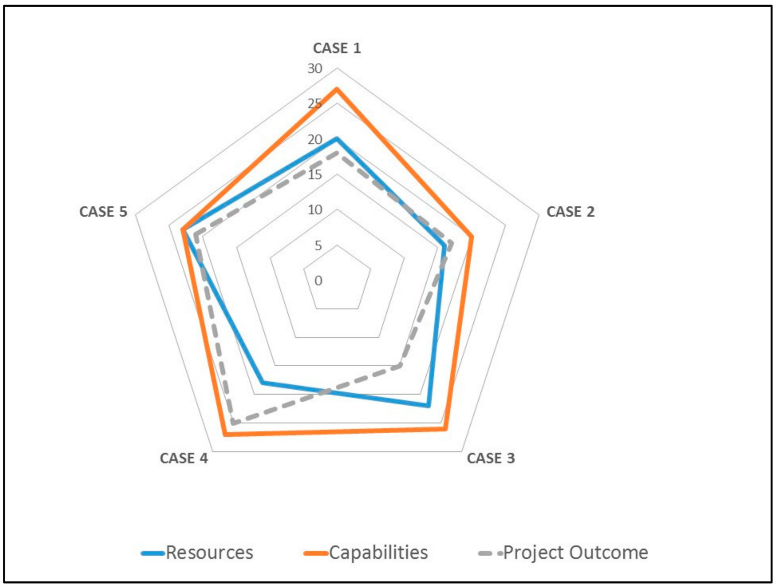

Figure 2. Comparative level of firms' resources and capabilities and the eco-innovation project outcomes in each of the studied cases.

In this phase of analysis, the study of the projects demonstrated relatively balanced levels of resources and capabilities, with the economic-financial ones slightly predominant.

The analysed firms all implemented eco-innovation solutions at different levels of the value chain; all had advanced environmental management systems and ISO 14001, ISO 50001, or EMAS standards. Furthermore, in four of the five cases, a medium level was identified when investigating their capability to align eco-innovation with the corporate strategy in order to improve their competitiveness, in their level of ability to overcome the regulation barriers, in their managerial capability for eco-innovation and in their ability to collaborate fin R&D with R&D Institutes.

An in-depth analysis of the projects revealed a clear relation between the firms' resources and capabilities and a high level of the outcomes obtained in four of the projects, such as the reduction of raw materials or resources, emissions reduction, or the replacement of resources or raw materials with other renewable or recycled ones. These results were obtained from large companies with low liquidity indexes that had specific human capital and held green patents, although not in high numbers. Moreover, certain relations were detected among the capabilities related to strategy and to managerial proactivity in environmental terms and the capabilities to overcome legislative barriers and to comply with CSR.

This extended analysis classified the relevance of the available economic-financial resources and capabilities and compared them with the environmental ones. In a high number of cases the financial indicators, such as present net value, payback time, internal rate of return and return on investment [161] continued to be the most common decision-making factors in firms because of the risk level associated with innovation projects [162]. Nevertheless, in Figure 3 it can be observed that the environmental resources and capabilities represented an important percentage of the total resources in almost all of the analysed cases.

A comparison of all of the case study variables revealed a balanced situation, in global terms, between economic-financial and environmental variables (Table 8).

In summary, the integrated measurement of the factors related to the analysed eco-innovation projects can be observed in the Figure 3.

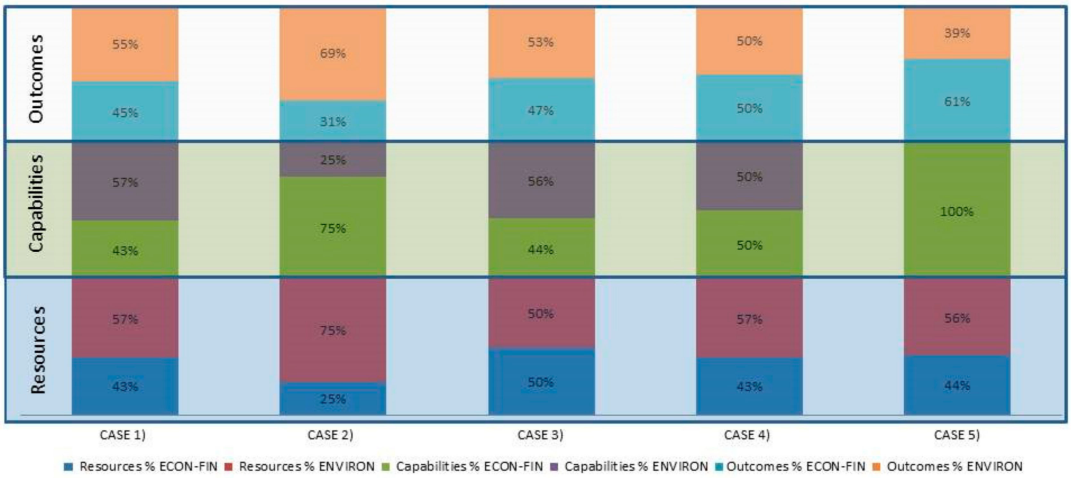

Figure 3. Percentages of the available resources and capabilities of firms and the project outcomes. They are classified according to two typologies variables: economic-financial and environmental.

Table 8. Frequency of the same levels of firms' resources and capabilities vs eco-innovation projects' outcomes in the analysed cases.

	PE_RW High	PE_ EMIS High	PE_REPL High	PE_ECOD High
RF_CR Low	3	3	3	3
RF_SIZE High	3	3	3	3
RF_ROE High	2	2	2	2
RE_RHDIR High	3	3	3	3
RE_RH Low	1	1	1	–
RE_GP Low	3	3	3	3
CF_STRA High	3	3	3	3
CF_REG High	3	3	3	3
CF_MANAG High	3	3	3	3
CE_CSR Medium	3	3	3	3

In general terms, the analysis of the resources did not allow for the identification of clear patterns of the combinations of resources and capabilities but it can be noted that eco-innovation projects do not necessarily represent a high investment for companies on their total assets. In addition, the projects' profitability could be demonstrated in all cases as one of them was also profitable if grants were considered. One of the companies could not demonstrate specific environmental capabilities but the outcomes of its project obtained a clear environmental improvement. As a general consideration, the comparison of resources and capabilities of different companies that are supposed to be unique and inimitable from the perspective of RBV is an arduous task.

The qualitative analysis carried out in this study could be applied to different companies, in the attempt to measure, jointly and proportionally (through the matrix), the specific environmental aspects of eco-innovation with respect to those that are linked to the pursuit of profitability intrinsic to conventional innovation. The matrix allowed us to verify first of all that the indicators selected from the literature could be applied to undoubtedly eco-innovative projects. This can be considered a result that allows replicability to other projects.

Regarding the methodological simplification done for the projects comparison, it can be stated that the results described the projects in a reliable way and that they represented an approximation of interest for the comparison of the different projects of a company or of projects from different companies. Nevertheless, it has to be considered as a qualitative analysis that can only be carried out through the internal measurement of the factors.

In the following section, a brief discussion is included in order to relate the methodological development achieved in this study and its contribution to the knowledge of eco-innovation in the framework of the RBV that is a field of inquiry under development.

5. Discussion

It could be considered that the design of some empirical RBV studies suffers limitations due to the use of single factors to explain variation in firm performance and because most of them have been focused on a sample of firms from a single industry and they often measure each performance separately [46]. In response to this consideration, in this study, it was developed and tested an integrated set of indicators specifically designed to differentiate the resources from the capabilities that could be applied to firms from different industries. In general terms, some of the criticisms of RBV that set around its lack of practical solutions and their testing at the empirical level due to the complexity of RBV concepts [111], were overcome in this study by using differentiated metrics as proposed in the carried out case studies.

In another field of inquiry, the results suggested a potential interrelation of the firms' resources and the firms' capabilities to manage the eco-innovative projects suggested an overlap of eco-innovation resources and those resources used for conventional innovation, according to Kraaijenbrink [30] and Song [163]. The importance of the dynamic capabilities indicated by other authors [89,90,92] was also corroborated in this study, as was the relevance of managerial proactivity for eco-innovation projects [28,164] and the relevance of the ability to implement advanced environmental management systems [14,26,47].

Regarding firms' resources that were applied to the eco-innovation projects, age was clearly pertinent, which was in line with the results obtained by several authors [2,12,41,54,109,121,123–125,165]. The importance of human capital was also corroborated, in this specific case for eco-innovation projects [29,62,73,74] and the fact that four out of the five companies had green patents confirmed that continuous innovation is a relevant capability for eco-innovation, in line with other authors [2,62].

Regarding the projects outcomes, the main environmental result obtained by the companies was the reduction of raw materials and the resource saving. This was also in line with previous results reported in several studies [2,100,110,124,125,142,148–155]. The project time frame can be considered as relevant, as has been noted previously in works on project management [60]. In addition, it can be noted that the eco-innovation projects do not necessarily involve high levels of investment and that their profitability is clear in all the cases studied.

As a general remark, implications of a resource-based approach may be seen at the project management level, such as in R&D projects and in total business management [166]. For the decision-making process, the management control is regarded as dealing with the total operations of the company; the various stages or processes of the "value creation" of the company and on various levels of the company. Thus, the obtained results demonstrated that RBV theory can provide additional insight over traditional organizations' understandings, in response to the doubts exposed by some authors, in particular regarding the specific internal factors allocated to eco-innovation projects.

6. Conclusions

In summary, through the analysis of five applied eco-innovation projects, selected as case studies, the relevance of the specific economic-financial and environmental resources and capabilities available for eco-innovation in firms were analysed in order to test an integrated measurement method. The method was developed in this study to differentiate and classify a wide number of eco-innovation indicators from an RBV perspective.

The achieved results increased the knowledge about how to measure the impact on the eco-innovation projects' outcomes of the resources and capabilities of firms to empirically analyse their specificity for eco-innovation investments. This is a line of inquiry that is still relatively unexplored in the literature within the RBV because resources, capabilities and eco-innovation outcomes have not previously been combined in the literature in the same integrated measurement framework. In fact, the main methodological contribution of this paper is related to the definition and classification of a wide range of indicators specifically designed for eco-innovation projects that have been empirically tested from a management control point of view for the decision-making process by understanding the influence that these two types of resources and capabilities exert on the projects' outcomes.

As a general remark, it can be stated that the analysis of the eco-innovative projects carried out by firms suggests an overlap of specific resources applied to eco-innovation and those resources used for conventional innovation, with levels of resources and capabilities being relatively balanced for eco-innovation projects results the economic-financial ones was slightly predominant, despite the fact that the analysed projects did not necessarily involve high levels of investment.

The age of the firms, the availability of specialized human capital and the project time frame can also be considered as relevant internal factors for eco-innovation. The reduction in the raw materials or resources needed was one of the results frequently obtained by the projects; their profitability was also clear in all of the study cases.

This enhanced understanding about the internal factors applied by companies to eco-innovation investments is of interest to academics in the field of project management from the perspective of RBV. The results are also useful for practitioners, as they will more fully understand the application of resources to the eco-innovation projects and the strategic capabilities of their companies. For the decision-making process, measurement and control is regarded as dealing with the total operations of the company and the various stages or eco-innovation processes. In addition, these indicators can be used by companies for sustainability reporting and assurance.

A relevant limitation of this study concerns the measurement of eco-innovation projects level of detail that is required to precisely define the obtained results. A long-term plan of research and longitudinal data from a greater number of firms from other countries or sectors would improve this line of research.

Other possible methodological approaches may compare conventional innovation projects with eco-innovation projects in the same firms in order to specifically analyse the overlap of resources and capabilities in conventional innovation and in eco-innovation projects in the field of project management control.

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Appendix A

Table A1. Variables for measuring the firms' resources: Classification into three levels of resources and into dichotomies.

Resources of Firms		
Variables	**Description of Variables (3 Levels)**	**Description of Dichotomous Variables**
RF_SIZE = Size of the firms (average of 3 years, 2012–2013–2014)	Low: Less than 50 employees. Medium: 49–249 employees. High: 250 or greater employees.	1: Greater than 250 employees. 0: Fewer than 250 employees.
RF_LIAB = Debt structure of the firms—LIAB_ST (average of 3 years, 2012–2013–2014)	Low: Less than sector average value. Medium: Sector average value. High: Greater than sector average value.	1: Greater dependency on external resources with short-term maturity. 0: If the reliance is on external resources over the long term.
RF_LRV = leverage ratio of the firms—LRV (average 3 years 2012–2013–2014)	Low: Less than sector average value. Medium: Sector average value. High: Greater than sector average value.	1: Greater reliance on external resources. 0: Internal resources predominate.
RF_ROE = ROE of the firms—(average 3 years 2012–2013–2014)	Low: Less than sector average value. Medium: Sector average value. High: Greater than sector average value.	1: Positive profitability.0: Negative profitability.
RF_CR = Liquidity ratio of the firms (average 3 years 2012–2013–2014)	Low: Less than sector average value. Medium: Sector average value. High: Greater than sector average value.	1: More than 2. 0: Less than 2.
RE_RHDIR = managerial staff for eco-innovation (environmental, innovation and resource management departments, at the end of 2014)	Low: One position is covered. Medium: Two positions are covered. High: All the three positions are covered.	1: All the three positions are covered. 0: All the three positions are not covered.
RE_RH = High level of human resources devoted to eco-innovation related activities (% of human resources available in the environmental, innovation and resource management departments)	In the five cases, the percentage was between 0.5% and 7.5%. Thus: Low: Less than 2.83%. Medium: 2.83–5.16%. High: More than 5.16%.	1: More than 3.75%. 0: Less than 3.75%.(3.75% is half of the highest percentage).
RE_INV = Level of investment in environmental R&D (% of the total investment in R&D in 2014 of the total annual incomes)	In the five cases, the percentage was between 2% and 6%. Thus: Low: Less than 2%. Medium: 2–3.9%. High: More than 3.9%.	1: There is investment in eco-innovation. 0: If there is not investment in eco-innovation.
RE_GRANT = public subsidies and grants received by the firms for the environmental R&D investments	In the five cases, the percentage was between 2 and 28. Thus: Low: Less than 10. Medium: 10–19. High: More than 19.	1: There are grants for environmental investment. 0: There are not grants for environmental investment.
RE_GP = Green Patents registered by the firms	In the five cases, the percentage was between 0 and 62. Thus: Low: Less than 20. Medium: 21–41. High: More than 41.	1: There are green patents. 0: There are not any green patent.

Table A2. Variables used to measure the firms' capabilities: Classification in three levels of capabilities and dichotomies.

Capabilities of Firms		
Variables	**Description of Variables (3 Levels)**	**Description of Dichotomous Variables**
CF_STRA—Capability to align the business strategy with the regional policy for eco-innovation (Strategy-Likert Scale)	Low: Likert scale 0–3. Medium: Likert scale 4–6. High: Likert scale 6–10.	1: Likert scale 6–10. 0: Likert scale 0–5.
CF_AGE—Age of the firm	Low: Less than 10 years. Medium: 10–49 years. High: Older than 50 years.	The average age of the five companies analysed was 36. Thus: 1: More than 36 years. 0: Less than 36 years.
CF_REG—Firm capabilities to overcome the legislation barriers (Likert scale)	Low: Likert scale 0–3. Medium: Likert scale 4–6. High: Likert scale 6–10.	1: Likert scale 6–10. 0: Likert scale 0–5.
CF_MANAG—Managerial capabilities and leadership for eco-innovation (Likert scale)	Low: Likert scale 0–3. Medium: Likert scale 4–6. High: Likert scale 6–10.	1: Likert scale 6–10. 0: Likert scale 0–5.
CF_COL—Capability to collaborate for environmental R&D and public/private communication for eco-innovation (Likert scale)	Low: Likert scale 0–3. Medium: Likert scale 4–6. High: Likert scale 6-10.	1: Likert scale 6–10. 0: Likert scale 0–5.
CE_INTENS—Eco-innovation activity intensity (average implementation of eco-innovation measures—14 items—Likert scale)	Low: Likert scale 0–3.33. Medium: Likert scale 3.34–6.66. High: Likert scale 6.67–10.	1: Likert scale 6–10. 0: Likert scale 0–5.
CE_SCOPE—Technological capabilities to achieve the scope of the eco-innovation projects (4 areas—product, process, supply chain and management)	Low: One area affected by the measures. Medium: 2–3 areas affected by the measures. High: All areas (4) affected by the measures.	1: Various areas affected. 0: Only one area affected.
CE_ENVS—Advanced environmental management systems' implementation (energy audits, environmental management system of reduced scope and advanced environmental management system).	Low: Energy audits or environmental management system of reduced scope. Medium: Energy audits and environmental management system of reduced scope. High: Energy audits and advanced environmental management system.	1: The firm has reached the maximum level of energy auditing and environmental management system 0: The firm has not reached the maximum level of these capabilities.
CE_QUAL—Environmental quality standards (ISO 14001; ISO 50001; EMAS)	Low: Only one standard. Medium: Two standards. High: All the three standards.	1: 2–3 standards. 0: 0–1 standards.
CE_CSR—RSC report and environmental accounting activities (1.RSC report; 2. Accounting practices that differentiate env. topics were considered important; 3. Accounting in specific sub-accounts for env. Expenditures)	Low: Only one activity. Medium: Two activities. High: Three activities.	1: Three activities. 0: One or two activities.

Table A3. Variables measuring the eco-innovation project outcomes: classification into three levels of results and dichotomies.

Eco-Innovation Project Outcomes		
Variables	**Description of Dichotomous Variables**	
PF_PROFIT—Profitability index = net present value/investment of the project	1: The project NPV recovers the initial outlay at least once. 0: The project NPV not recovers the initial outlay at least once.	
PF_IRR—Internal rate return of the investment project	1: The project profitability is above 5%. 0: The project profitability is not above 5%.	
PF_INV—Level of investment (% project investment/total assets)	1: Higher than 3.5%. 0: Lower than 3.5%.	
PF_TIME—Time frame of the project	1: Higher than 10 years. 0: Lower than 10 years.	
PF_PB—Payback of the investment	1: The recovery period is during the first half of the economic horizon 0: The recovery period is not during the first half of the economic horizon.	
Variables	**Description of Variables (3 Levels)**	**Description of Dichotomous Variables**
PE_RRM—Decrease in resources/raw materials obtained through the eco-innovation project	Classified as low, medium or high according to the approximate percentage of raw materials or resources saved.	1: There is a reduction. 0: There is not reduction.
PE_RW—Decrease/recovery of waste obtained through the eco-innovation project	Classified as low, medium or high according to the approximate percentage of waste saved or recovered.	1: There is a reduction. 0: There is not reduction.
PE_EMIS—Reduction in emissions obtained through the eco-innovation project	Classified as low, medium or high according to the approximate percentage of emissions saved.	1: There is a reduction. 0: There is not reduction.
PE_REPL—Replacement of materials/resources through the eco-innovation project	Classified as low, medium or high according to the approximate percentage of raw materials or resources replaced by other renewable or recycled materials.	1: There is a replacement. 0: There is not replacement.
PR_ECOD—Eco-design for environmental improvements in the phase of use or end of life	Low, medium, or high level of modifications for environmental improvements (eco-design) in the product (or process) performed (approximated).	1: There is a product eco-design. 0: There is not product eco-design.

Appendix B

Table A4. Project data 'sheets' used to collect details about the eco-innovation projects.

Company *:				LOGO of Photo *
Eco-Innovation *:				
Website *				
☐ Finished ☐ Ongoing *(months)*:_______ Place:_____________ Starting date *:________ Final date: ________				
Type of Eco-Innovation *:	☐ Product ☐ Marketing	☐ Process ☐ Organizational	Total Investment:______________€	
Activity *:	☐ Material or resources saving ☐ Waste recovery ☐ Emissions saving			☐ Material or resources substitution ☐ Industrial Symbiosis ☐ Waste recycling
Main goal *: Main goal *:	☐ Costs saving ☐ Market improvement			☐ Environmental improvement ☐ Green product
Project management *:	☐ The idea has been developed by the company (approx.):_______% ☐ Collaboration with R&D Centers (approx.): _______%			
Results *: ☐ Energy saving (approx.):_______% ☐ Raw material saving (approx.): ______% ☐ Emission saving (approx.):_____% ☐ Waste saving (approx.): _____% ☐ Costs saving (approx.): _____% ☐ Waste recovery (approx.): _____% ☐ Recycling improvement (approx.):______% ☐ Other:__________________%				
Short description of the eco-innovation process or product *: Technical Characteristics (technology, equipment, process) *:				

* Information contained in an asterisk * will be published on the project website http://www.reco-inno.fcirce.es. The remaining information is confidential.

Table A5. Questions of the brief interviews that were conducted with the managers of the firms in the framework of the eco-innovation campaign.

Questions *	Variables
In your opinion, is the regional policy for eco-innovation relevant for your business and is your company able to compete in the region in the framework of the regional policy?	CF_STRA—Capability to align the business strategy with the regional policy for eco-innovation (Strategy)
In your opinion, are the barriers to eco-innovation for your business relevant and is your company able to overcome the legal barriers?	CF_REG—Firm capabilities to overcome the legislation barriers
In your opinion, are the firm's managers directly involved in eco-innovation projects and are leading them?	CF_MANAG—Managerial capabilities and leadership for eco-innovation
In your opinion, is the firm collaborating with R&D centers at a regional level and is it able to manage the communication activities for the eco-innovation promotion?	CF_COL—Capability to collaborate for environmental R&D and public/private communication for eco-innovation

* Note: Respondents were asked to give an answer to each question and also to define their perception using a Likert scale.

References

1. Díaz-García, C.; González-Moreno, Á.; Sáez-Martínez, F.J. Eco-innovation: Insights from a literature review. *Innovation* **2015**, *17*, 6–23. [CrossRef]
2. Doran, J.; Ryan, G. Regulation and firm perception, eco-innovation and firm performance. *Eur. J. Innov. Manag.* **2012**, *15*, 421–441. [CrossRef]
3. Mele, C.; Russo-Spena, T. Eco-innovation practices. *J. Organ. Chang. Manag.* **2011**, *28*, 4–25. [CrossRef]
4. Aranda-Usón, A.; Ferreira, G.; Mainar-Toledo, M.D.; Scarpellini, S.; Llera Sastresa, E. Energy consumption analysis of Spanish food and drink, textile, chemical and non-metallic mineral products sectors. *Energy* **2012**, *42*, 477–485. [CrossRef]
5. Kemp, R.; Oltra, V. Research insights and challenges on eco-innovation dynamics. *Ind. Innov.* **2011**, *18*, 249–253. [CrossRef]
6. Porter, M.E.; Van der Linde, C. Green and competitive: Ending the stalemate. *Long Range Plan.* **1995**, *28*, 128–129. [CrossRef]
7. Scarpellini, S.; Valero-Gil, J.; Rivera-Torres, P.; Garcés-Ayerbe, C. Analysis of the generation of economic results in the different phases of the pro-environmental change process. *J. Clean. Prod.* **2017**, *168*, 1473–1481. [CrossRef]
8. López, F.J.D.D.; Montalvo, C. A comprehensive review of the evolving and cumulative nature of eco-innovation in the chemical industry. *J. Clean. Prod.* **2015**, *102*, 30–43. [CrossRef]
9. He, F.; Miao, X.; Wong, C.W.Y.; Lee, S. Contemporary corporate eco-innovation research: A systematic review. *J. Clean. Prod.* **2018**, *174*, 502–526. [CrossRef]
10. Shih, D.H.; Lu, C.M.; Lee, C.H.; Cai, S.Y.; Wu, K.J.; Tseng, M.L. Eco-innovation in circular agri-business. *Sustainability* **2018**, *10*, 1140. [CrossRef]
11. Daddi, T.; Testa, F.; Frey, M.; Iraldo, F. Exploring the link between institutional pressures and environmental management systems effectiveness: An empirical study. *J. Environ. Manag.* **2016**, *183*, 647–656. [CrossRef] [PubMed]
12. Scarpellini, S.; Valero-Gil, J.; Portillo-Tarragona, P. The 'economic-finance interface' for eco-innovation projects. *Int. J. Proj. Manag.* **2016**, *34*, 1012–1025. [CrossRef]
13. Valero-Gil, J.; Scarpellini, S.; Garcés-Ayerbe, C.; Rivera-Torres, P. Environment and innovation in spanish business: Bridging the gap between academics and practitioners. *Univ. Bus. Rev.* **2017**, *54*, 90–109. [CrossRef]
14. Demirel, P.; Kesidou, E. Stimulating different types of eco-innovation in the UK: Government policies and firm motivations. *Ecol. Econ.* **2011**, *70*, 1546–1557. [CrossRef]
15. Doran, J.; Ryan, G. The Importance of the Diverse Drivers and Types of Environmental Innovation for Firm Performance. *Bus. Strateg. Environ.* **2016**, *25*, 102–119. [CrossRef]
16. Ekins, P. Eco-innovation for environmental sustainability: Concepts, progress and policies. *Int. Econ. Econ. Policy* **2010**, *7*, 267–290. [CrossRef]
17. Hojnik, J.; Ruzzier, M. The driving forces of process eco-innovation and its impact on performance: Insights from Slovenia. *J. Clean. Prod.* **2016**, *133*, 812–825. [CrossRef]
18. Leitner, A.; Wehrmeyer, W.; France, C. Management Research Review The impact of regulation and policy on radical eco-innovation: The need for a new understanding. *Eur. J. Innov. Manag.* **2010**, *33*, 1022–1041.
19. Tseng, M.-L.; Huang, F.; Chiu, A.S.F. Performance drivers of green innovation under incomplete information. *Procedia Soc. Behav. Sci.* **2012**, *40*, 234–250. [CrossRef]
20. Cai, W.; Li, G. The drivers of eco-innovation and its impact on performance: Evidence from China. *J. Clean. Prod.* **2018**, *176*, 110–118. [CrossRef]
21. Kiefer, C.P.; Carrillo-Hermosilla, J.; Del Río, P.; Callealta Barroso, F.J. Diversity of eco-innovations: A quantitative approach. *J. Clean. Prod.* **2017**, *166*, 1494–1506. [CrossRef]
22. Aragon-Correa, J.A.; Leyva-de la Hiz, D.I. The Influence of Technology Differences on Corporate Environmental Patents: A Resource-Based Versus an Institutional View of Green Innovations. *Bus. Strateg. Environ.* **2016**, *25*, 421–434. [CrossRef]
23. Coenen, L.; Díaz López, F.J. Comparing systems approaches to innovation and technological change for sustainable and competitive economies: An explorative study into conceptual commonalities, differences and complementarities. *J. Clean. Prod.* **2010**, *18*, 1149–1160. [CrossRef]
24. Henriques, I.; Sadorsky, P. The relationship between environmental commitment and managerial perceptions of stakeholder importance. *Acad. Manag. J.* **1999**, *42*, 87–99. [CrossRef]

25. Paraschiv, D.M.; Voicu-Dorobantu, R.; Langa Olaru, C.; Laura Nemoianu, E. New models in support of the eco-innovative capacity of companies—A theoretical approach. *Econ. Comput. Econ. Cybern. Stud. Res.* **2012**, *5*.
26. Wagner, M. On the relationship between environmental management, environmental innovation and patenting: Evidence from German manufacturing firms. *Res. Policy* **2007**, *36*, 1587–1602. [CrossRef]
27. Amit, R.; Schoemaker, P.J.H. Strategic Assets and Organizational Rent. *Strateg. Manag. J.* **1993**, *14*, 33–46. [CrossRef]
28. Del Río, P.; Carrillo-hermosilla, J.; Könnölä, T.; Bleda, M. Resources, capabilities and competences for eco-innovation. *Technol. Econ. Dev. Econ.* **2016**, *22*, 274–292. [CrossRef]
29. Halila, F.; Rundquist, J. The development and market success of eco-innovations: A comparative study of eco-innovations and "other" innovations in Sweden. *Eur. J. Innov. Manag.* **2011**, *14*, 278–302. [CrossRef]
30. Kraaijenbrink, J.; Spender, J.-C.; Groen, A.J. The RBV: A Review and Assessment of its Critiques. *J. Manag.* **2010**, *36*, 349–372. [CrossRef]
31. May, G.; Taisch, M.; Kerga, E. Assessment of sustainable practices in new product development. In *Advances in Production Management Systems. Value Networks: Innovation, Technologies, and Management*; HAL: Lyon, France, 2012; pp. 437–447. Available online: https://hal.inria.fr/hal-01524233/document (accessed on 4 September 2018).
32. Ramanathan, R.; Ramanathan, U.; Zhang, Y. Linking operations, marketing and environmental capabilities and diversification to hotel performance: A data envelopment analysis approach. *Int. J. Prod. Econ.* **2016**, *176*, 111–122. [CrossRef]
33. Del Río, P.; Romero-Jordán, D.; Peñasco, C. Analysing firm-specific and type-specific determinants of eco-innovation. *Technol. Econ. Dev. Econ.* **2017**, *23*, 270–295. [CrossRef]
34. Ahola, T.; Ruuska, I.; Artto, K.; Kujala, J. What is project governance and what are its origins? *Int. J. Proj. Manag.* **2014**, *32*, 1321–1332. [CrossRef]
35. Srivannaboon, S.; Milosevic, D.Z. A two-way influence between business strategy and project management. *Int. J. Proj. Manag.* **2006**, *24*, 493–505. [CrossRef]
36. Penrose, E.T. *The Theory of the Growth of the Firm*, 4th ed.; Oxford University Press: New York, NY, USA, 1959; ISBN 0199573840.
37. Barney, J.B. Firm Resources and Sustained Competitive Advantage. *J. Manag.* **1991**, *17*, 99–120. [CrossRef]
38. Barney, J.B. Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. *J. Manag.* **2001**, *27*, 643–650. [CrossRef]
39. De Marchi, V.; Grandinetti, R. Knowledge strategies for environmental innovations: The case of Italian manufacturing firms. *J. Knowl. Manag.* **2013**, *17*, 569–582. [CrossRef]
40. Lee, K.H.; Min, B. Green R&D for eco-innovation and its impact on carbon emissions and firm performance. *J. Clean. Prod.* **2015**, *108*, 534–542. [CrossRef]
41. Kesidou, E.; Demirel, P. On the drivers of eco-innovations: Empirical evidence from the UK. *Res. Policy* **2012**, *41*, 862–870. [CrossRef]
42. Priem, R.L.; Butler, J.E. Is the resource-based 'view' a useful perspective for strategic management research? *Acad. Manag. Rev.* **2001**, *26*, 22–40. [CrossRef]
43. Barney, J.B. Is the resource-based 'view' a useful perspective for strategic management research? Yes. *Acad. Manag. Rev.* **2001**, *26*, 41–56. [CrossRef]
44. Peteraf, M.A. The Cornerstones of Competitive Advantage: A Resource Based View. *Strateg. Manag. J.* **1993**, *14*, 179–191. [CrossRef]
45. Helfat, C.E.; Peteraf, M.A. Understanding dynamic capabilities: Progress along a developmental path. *Strateg. Organ.* **2009**, *7*, 91–102. [CrossRef]
46. Carmeli, A.; Tishler, A. Resources, capabilities, and the performance of industrial firms: A multivariate analysis. *Manag. Decis. Econ.* **2004**, *25*, 299–315. [CrossRef]
47. Horbach, J. Determinants of environmental innovation—New evidence from German panel data sources. *Res. Policy* **2008**, *37*, 163–173. [CrossRef]
48. Horbach, J.; Rammer, C.; Rennings, K. Determinants of eco-innovations by type of environmental impact—The role of regulatory push/pull, technology push and market pull. *Ecol. Econ.* **2012**, *78*, 112–122. [CrossRef]
49. Rave, T.; Goetzke, F.; Larch, M. The Determinants of Environmental Innovations and Patenting: Germany Reconsidered. 2011. Available online: https://www.cesifo-group.de/DocDL/IfoWorkingPaper-97.pdf (accessed on 4 September 2018).

50. Wagner, M. Empirical influence of environmental management on innovation: Evidence from Europe. *Ecol. Econ.* **2008**, *66*, 392–402. [CrossRef]
51. Mazzanti, M.; Zoboli, R. Economic instruments and induced innovation: The European policies on end-of-life vehicles. *Ecol. Econ.* **2006**, *58*, 318–337. [CrossRef]
52. Andersen, M.M. Entrepreneurship and Innovation—Organizations, Institutions, Eco-innovation—Towards a Taxonomy and a Theory. In *DRUID 25th Conference 2008 on Entrepreneurship and Innovation*; DIME Accademy: Aalborg, Denmark, 2008; pp. 1–16.
53. Belin, J.; Horbach, J.; Oltra, V. Determinants and Specificities of Eco-Innovations: An Econometric Analysis for the French and German Industry Based on the Community Innovation Survey. 2011. Available online: http://cahiersdugretha.u-bordeaux4.fr/2011/2011-17.pdf (accessed on 4 September 2018).
54. Kammerer, D. The effects of customer benefit and regulation on environmental product innovation. Empirical evidence from appliance manufacturers in Germany. *Ecol. Econ.* **2009**, *68*, 2285–2295. [CrossRef]
55. Crossan, M.M.; Lane, H.W.; White, R.E. An Organizational Learning Freamwork: From Intuition to Institution. *Acad. Manag. Rev.* **1999**, *24*, 522–537. [CrossRef]
56. Adams, R.; Bessant, J.; Phelps, R. Innovation management measurement: A review. *Int. J. Manag. Rev.* **2006**, *8*, 21–47. [CrossRef]
57. Keupp, M.M.; Palmié, M.; Gassmann, O. The Strategic Management of Innovation: A Systematic Review and Paths for Future Research. *Int. J. Manag. Rev.* **2012**, *14*, 367–390. [CrossRef]
58. Johnson, D.K.N.; Lybecker, K.M. Paying for green: An economics literature review on the constraints to financing environmental innovation. *Electron. Green J.* **2012**, *1*, 1–10. [CrossRef]
59. Cruz-Cázares, C.; Bayona-Sáez, C.; García-Marco, T. You can't manage right what you can't measure well: Technological innovation efficiency. *Res. Policy* **2013**, *42*, 1239–1250. [CrossRef]
60. Grimsey, D.; Lewis, M.K. Evaluating the risks of public private partnerships for infrastructure projects. *Int. J. Proj. Manag.* **2002**, *20*, 107–118. [CrossRef]
61. Schumpeter, J.A. *The Economics and Sociology of Capitalism*; Swedberg, R., Ed.; Princeton University Press: Princeton, NJ, USA, 1942; ISBN 978-0691003832.
62. Segarra-Oña, M.V.; Peiró-Signes, A.; Albors-Garrigós, J.; Miret-Pastor, P. Impact of innovative practices in environmentally focused firms: Moderating factors. *Int. J. Environ. Res.* **2011**, *5*, 425–434.
63. Carrillo-Hermosilla, J.; Del Río, P.; Könnölä, T. Diversity of eco-innovations: Reflections from selected case studies. *J. Clean. Prod.* **2010**, *18*, 1073–1083. [CrossRef]
64. Ding, M. Supply chain collaboration toward eco-innovation: An SEM analysis of the inner mechanism. In Proceedings of the 2014 IEEE International Conference on Service Operations and Logistics, and Informatics, SOLI 2014, Qingdao, China, 8–10 October 2014; pp. 129–134.
65. Parthasarthy, R.; Hammond, J. Product innovation input and outcome:moderating effects of the innovation process. *J. Eng. Technol. Manag.* **2002**, *19*, 75–91. [CrossRef]
66. Triguero, A.; Moreno-Mondéjar, L.; Davia, M.A. Leaders and Laggards in Environmental Innovation: An Empirical Analysis of SMEs in Europe. *Bus. Strateg. Environ.* **2016**, *25*, 28–39. [CrossRef]
67. Peiró-Signes, Á.; Segarra-Oña, M.d.V.; Miret-Pastor, L.; Verma, R. Eco-innovation attitude and industry's technological level—An important key for promoting efficient vertical policies. *Environ. Eng. Manag. J.* **2011**, *10*, 1893–1901. [CrossRef]
68. Aragón-Correa, J.A.; Rubio-López, E. Proactive Corporate Environmental Strategies: Myths and Misunderstandings. *Long Range Plan.* **2007**, *40*, 357–381. [CrossRef]
69. González-Benito, J.; González-Benito, Ó. A review of determinant factors of environmental proactivity. *Bus. Strateg. Environ.* **2006**, *15*, 87–102. [CrossRef]
70. Sharma, P.; Sharma, S. Drivers of Proactive Environmental Strategy in Family Firms. *Bus. Ethics Q.* **2011**, *21*, 309–334. [CrossRef]
71. Pons, D. Project management for new product development. *Proj. Manag. J.* **2008**, *39*, 82–97. [CrossRef]
72. Kemp, R.; Pearson, P.; Arundel, A.; Borup, M.; Dorronsoro, I.C.; Andersen, D.; De Vries, F.; Lázaro, J.E.; Foxon, T.; Sedano, J.A.G.; et al. Final Report MEI Project about Measuring Eco-Innovation. 2007. Available online: https://www.oecd.org/env/consumption-innovation/43960830.pdf (accessed on 4 September 2018).
73. Kijek, T.; Kasztelan, A. Eco-innovation as a factor of sustainable development. *Probl. Ekorozwoju* **2013**, *8*, 103–111.

74. Paraschiv, D.M.; Nemoianu, E.L.; Langa, C.A.; Szabó, T. Eco-innovation, responsible leadership and organizational change for corporate sustainability. *Amfiteatru Econ.* **2012**, *14*, 404–419.
75. Richardson, G.B. The organisation of industry. *Econ. J.* **1972**, *82*, 883–896. [CrossRef]
76. Chandler, A.D. Organizational capabilities and the economic history af the industrial enterprise. *J. Econ. Perspect.* **1992**, *6*, 79–100. [CrossRef]
77. Chiesa, V.; Frattini, F.; Lazzarotti, V.; Manzini, R. An exploratory study on R&D performance measurement practices: A survey of Italian R&D intensive firms. *Int. J. Innov. Manag.* **2009**, *13*, 65–104. [CrossRef]
78. Dosi, G. Technological paradigms and technological trajectories. A suggested interpretation of the determinants and directions of technical change. *Res. Policy* **1982**, *11*, 147–162. [CrossRef]
79. Grant, R. Toward a knoweldge-based theory of the firm. *Strateg. Manag. J.* **1996**, *17*, 109–122. [CrossRef]
80. Nelson, R.; Winter, S. An Evolutionary Theory of Economic Change. Available online: http://inctpped.ie.ufrj.br/spiderweb/pdf_2/Dosi_1_An_evolutionary-theory-of_economic_change..pdf (accessed on 4 September 2018).
81. Schaltegger, S.; Wagner, M. Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Bus. Strateg. Environ.* **2011**, *20*, 222–237. [CrossRef]
82. Frondel, M.; Horbach, J.; Rennings, K. End-of-pipe or cleaner production? An empirical comparison of environmental innovation decisions across OECD countries. *Bus. Strateg. Environ.* **2007**, *16*, 571–584. [CrossRef]
83. Muller, A.; Välikangas, L.; Merlyn, P. Metrics for innovation: Guidelines for developing a customized suite of innovation metrics. *IEEE Eng. Manag. Rev.* **2005**, *33*, 66–72. [CrossRef]
84. Oltra, V.; Jean, M.S. The dynamics of environmental innovations: Three stylised trajectories of clean technology. *Econ. Innov. New Technol.* **2005**, *14*, 189–212. [CrossRef]
85. Biedenbach, T. The power of combinative capabilities: Facilitating the outcome of frequent innovation in pharmaceutical R&D projects. *Proj. Manag. J.* **2011**, *42*, 63–80. [CrossRef]
86. Taylor, P.L.; Murray, D.L.; Raynolds, L.T. Keeping trade fair: Governance challenges in the fair trade coffee initiative. *Sustain. Dev.* **2005**, *13*, 199–208. [CrossRef]
87. Kemp, R.; Soete, L. The greening of technological progress. An evolutionary perspective. *Futures* **1992**, *24*, 437–457. [CrossRef]
88. Pereira, Á.; Vence, X. Key business factors for eco-innovation: An overview of recent firm-level empirical studies. *Cuad. Gest.* **2012**, *12*, 73–103. [CrossRef]
89. Eisenhardt, K.M.; Martin, J.A. Dynamic capabilities: What are they? *Strateg. Manag. J.* **2000**, *21*, 1105–1121. [CrossRef]
90. Gabler, C.B.; Richey, R.G.; Rapp, A. Developing an eco-capability through environmental orientation and organizational innovativeness. *Ind. Mark. Manag.* **2015**, *45*, 151–161. [CrossRef]
91. Georg, S.; Røpke, I.; Jørgensen, U. Clean technology—Innovation and environmental regulation. *Environ. Resour. Econ.* **1992**, *2*, 533–550.
92. Teece, D.J.; Pisano, G.; Shuen, A. Dynamic capabilities and strategic management. *Strateg. Manag. J.* **1997**, *18*, 509–533. [CrossRef]
93. Winn, S.F.; Roome, N.J. R&D management responses to the environment: Current theory and implications to practice and research. *R&D Manag.* **1993**, *23*, 147–160. [CrossRef]
94. Aragón-Correa, J.A.; Sharma, S. Resource-Based View of Proactive Corporate Environmental. *Acad. Manag. Rev.* **2003**, *28*, 71–88. [CrossRef]
95. Ar, I.M. The Impact of Green Product Innovation on Firm Performance and Competitive Capability: The Moderating Role of Managerial Environmental Concern. *Procedia Soc. Behav. Sci.* **2012**, *62*, 854–864. [CrossRef]
96. Cameron, K. Responsible Leadership as Virtuous Leadership. *J. Bus. Ethics* **2011**, *98*, 25–35. [CrossRef]
97. Cheng, C.-F.F.; Chang, M.-L.L.; Li, C.-S.S. Configural paths to successful product innovation. *J. Bus. Res.* **2013**, *66*, 2561–2573. [CrossRef]
98. Groves, K.S.; LaRocca, M.A. An Empirical Study of Leader Ethical Values, Transformational and Transactional Leadership, and Follower Attitudes Toward Corporate Social Responsibility. *J. Bus. Ethics* **2011**, *103*, 511–528. [CrossRef]
99. Pless, N.; Maak, T. Responsible Leadership: Pathways to the Future. *J. Bus. Ethics* **2011**, *98*, 3–13. [CrossRef]
100. De Marchi, V. Environmental innovation and R&D cooperation: Empirical evidence from Spanish manufacturing firms. *Res. Policy* **2012**, *41*, 614–623. [CrossRef]

101. Cohen, W.M.; Levinthal, D.A. Absorptive Capacity: A New Perspective on Learning and Innovation. *Adm. Sci. Q.* **1990**, *35*, 147–160. [CrossRef]
102. Freel, M.S. Sectoral patterns of small firm innovation, networking and proximity. *Res. Policy* **2003**, *32*, 751–770. [CrossRef]
103. McCann, P.; Simonen, J. Innovation, knowledge spillovers and local labour markets. *Pap. Reg. Sci.* **2005**, *84*, 465–485. [CrossRef]
104. Roper, S.; Du, J.; Love, J.H. Modelling the innovation value chain. *Res. Policy* **2008**, *37*, 961–977. [CrossRef]
105. Cainelli, G.; Mazzanti, M.; Zoboli, R. Environmental innovations, complementarity and local/global cooperation: Evidence from North-East Italian industry. *Int. J. Technol. Policy Manag.* **2011**, *11*, 328–368. [CrossRef]
106. Cao, M.; Zhang, Q. Supply chain collaboration: Impact on collaborative advantage and firm performance. *J. Oper. Manag.* **2011**, *29*, 163–180. [CrossRef]
107. Hammar, H.; Löfgren, Å. Explaining adoption of end of pipe solutions and clean technologies-Determinants of firms' investments for reducing emissions to air in four sectors in Sweden. *Energy Policy* **2010**, *38*, 3644–3651. [CrossRef]
108. Petruzzelli, A.M.; Dangelico, R.M.; Rotolo, D.; Albino, V. Organizational factors and technological features in the development of green innovations: Evidence from patent analysis. *Innov. Manag. Policy Pract.* **2011**, *13*, 291–310. [CrossRef]
109. Triguero, A.; Moreno-Mondéjar, L.; Davia, M.A. The influence of energy prices on adoption of clean technologies and recycling: Evidence from European SMEs. *Energy Econ.* **2014**, *46*, 246–257. [CrossRef]
110. Ketata, I.; Sofka, W.; Grimpe, C. The role of internal capabilities and firms' environment for sustainable innovation: Evidence for Germany. *R&D Manag.* **2014**, *45*, 60–75. [CrossRef]
111. Ljubica, V.B.; Cvelbar, K. Resources and Capabilities Driving Performance in the Hotel Industry. *Tour. Hosp. Manag.* **2016**, *22*, 225–246. [CrossRef]
112. Park, M.S.; Bleischwitz, R.; Han, K.J.; Jang, E.K.; Joo, J.H. Eco-innovation indices as tools for measuring eco-innovation. *Sustainability* **2017**, *9*, 2206. [CrossRef]
113. Eisenhardt, K.M. Building Theories from Case Study Research. *Acad. Manag. Rev.* **1989**, *14*, 532–550. [CrossRef]
114. Eisenhardt, K.M.; Graebner, M.E. Theory building from cases: Opportunities and challenges. *Acad. Manag. J.* **2007**, *50*, 25–32. [CrossRef]
115. Blaikie, N.W.H. Methods for Answering Research Questions: Data Gathering and Analysis. In *Designing Social Research: The logic of Anticipation*; Polity Press and Blackwell Pubblishers: Cambridge, UK, 2010; pp. 199–220, 264–265. ISBN 0745643388.
116. Akbar, H.; Mandurah, S. Project-conceptualisation in technological innovations: A knowledge-based perspective. *Int. J. Proj. Manag.* **2014**, *32*, 759–772. [CrossRef]
117. Maçaneiro, M.B.; da Cunha, S.K.; Balbinot, Z. Drivers of the Adoption of Eco-Innovations in the Pulp, Paper, and Paper Products Industry in Brazil. *Lat. Am. Bus. Rev.* **2013**, *14*, 179–208. [CrossRef]
118. Russo-Spena, T.; Mele, C. 'Five Co-s' in innovating: A practice-based view. *J. Serv. Manag.* **2012**, *23*, 527–553. [CrossRef]
119. Stosic, B.; Milutinovic, R.; Zakic, N.; Zivkovic, N. Selected indicators for evaluation of eco-innovation projects. *Innovation* **2016**, *29*, 177–191. [CrossRef]
120. Machiba, T. Eco-innovation for enabling resource efficiency and green growth: Development of an analytical framework and preliminary analysis of industry and policy practices. *Int. Econ. Econ. Policy* **2010**, *7*, 357–370. [CrossRef]
121. Santolaria, M.; Oliver-Sol, J.; Gasol, C.M.; Morales-Pinzón, T.; Rieradevall, J. Eco-design in innovation driven companies: Perception, predictions and the main drivers of integration. The Spanish example. *J. Clean. Prod.* **2011**, *19*, 1315–1323. [CrossRef]
122. Berkhout, F.; Hertin, J.; Jordan, A. Socio-economic futures in climate change impact assessment: Using scenarios as 'learning machines'. *Glob. Environ. Chang.* **2002**, *12*, 83–95. [CrossRef]
123. Biondi, V.; Iraldo, F.; Meredith, S. Achieving sustainability through environmental innovation: The role of SMEs. *Int. J. Technol. Manag.* **2002**, *24*, 612–626. [CrossRef]
124. Dong, Y.; Wang, X.; Jin, J.; Qiao, Y.; Shi, L. Effects of eco-innovation typology on its performance: Empirical evidence from Chinese enterprises. *J. Eng. Technol. Manag.* **2014**, *34*, 78–98. [CrossRef]

125. Galia, F.; Ingham, M.; Pekovic, S. Incentives for green innovations in French manufacturing firms. *Int. J. Technol. Manag. Sustain. Dev.* **2015**, *14*, 3–16. [CrossRef]
126. Przychodzen, J.; Przychodzen, W. Relationships between eco-innovation and financial performance—Evidence from publicly traded companies in Poland and Hungary. *J. Clean. Prod.* **2015**, *90*, 253–263. [CrossRef]
127. Wagner, M. Sustainability and Competitive Advantage: Empirical Evidence on the Influence of Strategic Choices between Environmental Management Approaches. *Environ. Qual. Manag.* **2005**, *14*, 31–48. [CrossRef]
128. Bartlett, D.; Trifilova, A. Green technology and eco-innovation: Seven case-studies from a Russian manufacturing context. *J. Manuf. Technol. Manag.* **2010**, *21*, 910–929. [CrossRef]
129. Chen, C.-J.; Huang, J.-W. Strategic human resource practices and innovation performance—The mediating role of knowledge management capacity. *J. Bus. Res.* **2009**, *62*, 104–114. [CrossRef]
130. Arundel, A. Measuring eco-innovation. *Account. Financ.* **2009**, *20*, 146. [CrossRef]
131. Aschhoff, B.; Sofka, W. Innovation on demand-Can public procurement drive market success of innovations? *Res. Policy* **2009**, *38*, 1235–1247. [CrossRef]
132. Aguilera-Caracuel, J.; Hurtado-Torres, N.E.; Aragón-Correa, J.A. Does international experience help firms to be green? A knowledge-based view of how international experience and organisational learning influence proactive environmental strategies. *Int. Bus. Rev.* **2012**, *21*, 847–861. [CrossRef]
133. Berrone, P.; Fosfuri, A.; Gelabert, L.; Gomez-Mejia, L.R. Necessity as the mother of 'green' inventions: Institutional pressures and environmental innovations. *Strateg. Manag. J.* **2013**, *34*, 891–909. [CrossRef]
134. Markatou, M. Studying innovation persistence in Greece: A patent data approach of 'heavy innovators'. In *Innovation and Sustainable Competitive Advantage: From Regional Development to World Economies, Proceedings of the 18th International Business Information Management Association Conference, Istanbul, Turkey, 9–10 May 2012*; Elsevier: New York, NY, USA, 2012; Volume 1, pp. 575–582.
135. Triguero, A.; Moreno-Mondéjar, L.; Davia, M.A. Drivers of different types of eco-innovation in European SMEs. *Ecol. Econ.* **2013**, *92*, 25–33. [CrossRef]
136. Négré, P.; Brusciotti, F.; Parra, M.B.; Durán, A.; Martín, Y.C.; Hamon, L.; Halut, J. Ecoprot, eco-friendly corrosion protecting coating of aluminium and magnesium alloys, an ECO innovation project. *Chem. Eng. Trans.* **2014**, *41*, 169–174. [CrossRef]
137. Albino, V.; Balice, A.; Dangelico, R.M. Environmental strategies and green product development: An overview on sustainability-driven companies. *Bus. Strateg. Environ.* **2009**, *18*, 83–96. [CrossRef]
138. Esty, D.; Winston, A. Why Environmental Initiatives Fail. In *Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage*; Yale University Press: London, UK, 2009; pp. 235–259. ISBN 0470393742.
139. Mylan, J.; Geels, F.W.; Gee, S.; McMeekin, A.; Foster, C. Eco-innovation and retailers in milk, beef and bread chains: Enriching environmental supply chain management with insights from innovation studies. *J. Clean. Prod.* **2015**, *107*, 20–30. [CrossRef]
140. Scarpellini, S.; Aranda, A.; Aranda, J.; Llera, E.; Marco, M. R&D and eco-innovation: Opportunities for closer collaboration between universities and companies through technology centers. *Clean Technol. Environ. Policy* **2012**, *14*, 1047–1058. [CrossRef]
141. Garcés-Ayerbe, C.; Scarpellini, S.; Valero-Gil, J.J.; Rivera-Torres, P.; Garcés Ayerbe, C.; Scarpellini, S.; Valero-Gil, J.J.; Rivera-Torres, P.; Garcés-Ayerbe, C.; Scarpellini, S.; et al. Proactive environmental strategy development: From laggard to eco-innovative firms. *J. Organ. Chang. Manag.* **2016**, *29*, 1118–1134. [CrossRef]
142. Klewitz, J. Intermediaries driving eco-innovation in SMEs: A qualitative investigation. *Eur. J. Innov. Manag.* **2012**, *15*, 442–467. [CrossRef]
143. Lee, S.Y.; Rhee, S.-K. The change in corporate environmental strategies: A longitudinal empirical study. *Manag. Decis.* **2007**, *45*, 196–216. [CrossRef]
144. Fleiter, T.; Hirzel, S.; Worrell, E. The characteristics of energy-efficiency measures—A neglected dimension. *Energy Policy* **2012**, *51*, 502–513. [CrossRef]
145. Leenders, M.A.A.M.; Chandra, Y. Antecedents and consequences of green innovation in the wine industry: The role of channel structure. *Technol. Anal. Strateg. Manag.* **2013**, *25*, 203–218. [CrossRef]
146. Cucchiella, F.; D'Adamo, I.; Lenny Koh, S.C.; Rosa, P. Recycling of WEEEs: An economic assessment of present and future e-waste streams. *Renew. Sustain. Energy Rev.* **2015**, *51*, 263–272. [CrossRef]

147. Cluzel, F.; Yannou, B.; Millet, D.; Leroy, Y. Identification and Selection of Eco-Innovative R&D Projects in Complex Systems Industries. In Proceedings of the 12th International Design Conference—DESIGN 2012, Dubrovnik, Croatia, 21–24 May 2012.
148. Issa, I.I.; Pigosso, D.C.A.A.; McAloone, T.C.; Rozenfeld, H. Leading product-related environmental performance indicators: A selection guide and database. *J. Clean. Prod.* **2015**, *108*, 321–330. [CrossRef]
149. Lin, C.Y.; Ho, Y.H. An empirical study on logistics service providers' intention to adopt green innovations. *J. Technol. Manag. Innov.* **2008**, *3*, 17–26.
150. Seroa da Motta, R. Analyzing the environmental performance of the Brazilian industrial sector. *Ecol. Econ.* **2006**, *57*, 269–281. [CrossRef]
151. Shuaib, M.; Seevers, D.; Zhang, X.; Badurdeen, F.; Rouch, K.E.; Jawahir, I.S. Product sustainability index (ProdSI): A metrics-based framework to evaluate the total life cycle sustainability of manufactured products. *J. Ind. Ecol.* **2014**, *18*, 491–507. [CrossRef]
152. Chen, Y.S. The driver of green innovation and green image—Green core competence. *J. Bus. Ethics* **2008**, *81*, 531–543. [CrossRef]
153. Cole, M.A.; Elliott, R.J.R.; Shimamoto, K. Industrial characteristics, environmental regulations and air pollution: An analysis of the UK manufacturing sector. *J. Environ. Econ. Manag.* **2005**, *50*, 121–143. [CrossRef]
154. Doonan, J.; Lanoie, P.; Laplante, B. Determinants of environmental performance in the Canadian pulp and paper industry: An assessment from inside the industry. *Ecol. Econ.* **2005**, *55*, 73–84. [CrossRef]
155. Hellström, T. Dimensions of environmentally sustainable Innovation: The structure of eco-innovation concepts. *Sustain. Dev.* **2007**, *15*, 148–159. [CrossRef]
156. Doran, J.; Ryan, G. Eco-Innovation—Does additional engagement lead to additional rewards? *Int. J. Soc. Econ.* **2014**, *41*, 1110–1130. [CrossRef]
157. Jasch, C. Environmental performance evaluation and indicators. *J. Clean. Prod.* **2000**, *8*, 79–88. [CrossRef]
158. Ziegler, A.; Seijas Nogareda, J. Environmental management systems and technological environmental innovations: Exploring the causal relationship. *Res. Policy* **2009**, *38*, 885–893. [CrossRef]
159. Calik, E.; Bardudeen, F. A Measurement Scale to Evaluate Sustainable Innovation Performance in Manufacturing Organizations. In *Procedia CIRP*; Elsevier B.V.: New York, NY, USA, 2016; Volume 40, pp. 449–454.
160. Hur, T.; Lee, J.; Ryu, J.; Kwon, E. Simplified LCA and matrix methods in identifying the environmental aspects of a product system. *J. Environ. Manag.* **2005**, *75*, 229–237. [CrossRef] [PubMed]
161. Graham, J.R.; Harvey, C.R. The theory and practice of corporate finance: Evidence from the field. *J. Financ. Econ.* **2001**, *60*, 187–243. [CrossRef]
162. Žižlavský, O. Net Present Value Approach: Method for Economic Assessment of Innovation Projects. *Procedia Soc. Behav. Sci.* **2014**, *156*, 506–512. [CrossRef]
163. Song, M.; Di Benedetto, C.A.; Nason, R.W. Capabilities and financial performance: The moderating effect of strategic type. *J. Acad. Mark. Sci.* **2007**, *35*, 18–34. [CrossRef]
164. Chang, C.-Y. A critical analysis of recent advances in the techniques for the evaluation of renewable energy projects. *Int. J. Proj. Manag.* **2013**, *31*, 1057–1067. [CrossRef]
165. Berkhout, F. Eco-innovation: Reflections on an evolving research agenda. *Int. J. Technol. Policy Manag.* **2011**, *11*, 191–197. [CrossRef]
166. Boström, P.S. Impact from the Resource-Based Approach on Strategy and Control; A new Framework for Empirical Research based on the "European Excellence Model". In Proceedings of the 11th QMOD Conference, Quality Management and Organizational Development, Helsingborg, Sweden, 20–22 August 2008; pp. 395–405.