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Creating a Competitive Advantage for Micro and Small Enterprises Based on Eco-Innovation as a Determinant of the Energy Efficiency of the Economy

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Abstract: The aim of this analysis is to identify the possibility of treating eco-innovation in micro and small enterprises as a factor influencing the energy efficiency of the economy. In order to obtain an answer to such a research question, quantitative research was carried out among Polish enterprises from the SME sector (N = 400). Accordingly, the CATI technique was applied. The selection of enterprises was random and took place in the non-returnable drawing process. The criterion for selecting the sample was the size of enterprises, but in order to ensure the possibility of drawing conclusions based on a sufficiently large research sample, its structure (300 micro and 100 small enterprises) assumed the study of small enterprises in a proportion greater than their actual share in the population of enterprises. As a result of this research, the existence of a relationship between the improvement of the company's competitive position and its activity in the field of eco-innovation implementation was confirmed. It is shown that the behavior and attitudes of entrepreneurs largely determine the very decisions regarding the use of specific types of eco-innovation, as well as the areas in which they brought about changes influencing the improvement of the competitive position of the surveyed companies. Differences in these decisions can be observed in micro and small companies. This article justifies the notion that the impact of the scale of micro and small companies is important in shaping the energy efficiency of the economy.

Keywords: energy efficiency; competitive advantage; eco-innovations; SMEs

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1. Introduction

Issues related to the need to protect the environment and climate are finding their way into the space of public discourse with increasing intensity. Although only a dozen or even several years ago, such voices calling for changes in attitudes were treated as calls to act in an undefined future, now they are materializing in real actions. They relate to virtually every area of life, and the common denominator for changes implemented in various areas of human activity, including the operation of enterprises, is the pursuit of a state in which there are no negative effects on human life or the natural environment. The essence, therefore, is to limit the intensity of anthropopression, thus leading to minimization of the use of non-recyclable materials and raw materials in manufacturing processes and in individual consumption, reducing the amount of waste generated, as well as reducing greenhouse gas emissions by decreasing energy consumption within the economy [1].

The perception of changes taking place in the environment (climate change and the legislative changes that follow them) and the accompanying market trends (e.g., related to

increasing consumer awareness, including energy awareness [2]), as well as the ability to turn them into market success, are the foundations for building a competitive advantage for enterprises. Achieved via market success (increased sales, improved profitability, etc.), the effects in the form of, for example, reduced energy consumption are a benefit for the economy. Here, we are dealing with a situation in which the effects on a macro scale are the sum of the effects obtained thanks to the activities of individual enterprises. In addition, these activities are associated with the implementation of new business processes or technological solutions in enterprises, which often involves activating additional resources and/or requires specialized competences.

Discussion of the competitiveness and competitive advantage of enterprises is common in the literature on strategic management, but less attention is paid in the research to enterprises from the SME sector, especially in the context of innovation and eco-innovation. The main theories explaining competitiveness at the company level are derived, on the one hand, from industrial trend organization theory (IO) and Porter's 5 Forces concept [3], while on the other hand, there is the resource-based view (RBV) expounded by Prahaland and Hamel [4] and their concept of key resources, and Eisenhardt and Martin [5], who presented a dynamic perspective of the resource approach. With regard to the competitiveness of SMEs, concepts based on a configuration approach are useful, whereby a unique combination of various factors, both external and internal, has an impact on the competitive position [6–10]. Dynamic changes in the market environment and the growing importance of awareness of the impact of enterprises on the environment force companies from the SME sector to take actions to adapt to the pro-ecological policy in order to build a competitive advantage. Based on the above-mentioned concepts, it is worth learning more about the competitiveness factors of SMEs related to the implementation of eco- innovations in the context of energy efficiency.

Directing economic life towards 'green growth' [11] leads to better economic results in many countries and the emergence of new, much more ecological competitive advantages [12,13], especially thanks to the intensification of absorption and diffusion of eco-innovations. Eco-innovations are defined differently in the literature on the subject. They can be perceived in both narrow [14] and broad terms [15]. The literature on the subject of eco-innovation focuses primarily on attempts to indicate the effects of the implementation of eco-innovation on the environment [16–23], as well as on the companies themselves [18,24,25]. The items also indicate the determinants of the implementation of eco-innovations [26] or methods for measuring the innovativeness of companies [21,27,28]. Thus, in the opinion of the research team, the important aspect linking all these issues is omitted, indicating that the eco-innovation activity of enterprises is an important factor influencing the building of a company's competitive advantage in the context of the energy efficiency of the entire economy.

Of course, eco-innovation is a concept that goes beyond the mere issue of energy efficiency, and also refers to the optimization of resource use or the rationalization of waste management. The interest of the research team in the issue of efficiency, including increasing energy from renewable sources in the final consumption structure, results from the conviction that the impact on energy efficiency can bring about effects that can be felt both by enterprises and on a macro scale in the short term.

Current research shows [29] that renewable energy and energy efficiency are significantly correlated with each other and have a positive impact on innovation. One of the areas of innovative activity of enterprises is the creation of eco-innovations, the main goal of which is to reduce energy consumption by enterprises at various stages of their activity—production. Energy and the related energy efficiency have for years been an important topic that scientists and politicians have been dealing with by sharing their research results, observations and recommendations in industry reports or literature on the subject [30–32].

Based on the previous achievements of the members of the research team, this analysis aims to investigate the determinants of the implementation of eco-innovation by enterprises and its business impact.

The aim of the analysis focuses on the identification of the possibility of treating eco-innovation in micro and small enterprises as a factor influencing the energy efficiency of the economy in various scopes and approaches:

- Time—the effects of implementing eco-innovations leading to the optimization of energy consumption may be felt both from a short-term and from a long-term perspective;
- Subjective—positive effects can be identified both on the micro scale (enterprise level) and on the macro scale (economy level).

Confirmation of the need to deal with the subject matter, both on scientific grounds and through implementation at the enterprise level, also results from the current geopolitical situation, which is manifested in the energy crisis. As a result, activities to improve the energy efficiency of the economy must be the focus of attention of scientists, representatives of the administration and, finally, the business sector.

2. Materials and Methods

The discussed issue is an important cognitive trend. These studies can be carried out with various methods, making it possible to obtain results of both quantitative and qualitative nature, and their differentiation and selection is an important decision dilemma in the research process.

The first stage of the research process was the analysis of the literature on the subject (desk research). During the study of literature, theoretical foundations of the issue under study were identified. The focus was primarily on publications in the field of management theory, building a competitive advantage, energy efficiency, and eco-innovation. These issues were related to the subject entries used to search the databases of scientific publications and library collections. In this way, attempts were made to systematize the theoretical foundations of the issue and to become acquainted with the results of research conducted by other authors. Attempts were made to establish the relationships and dependencies between the implementation of eco-innovations by enterprises and their creation of a competitive advantage in the context of energy efficiency of the economy, as well as to take up the subject of the conditions for implementing innovations in micro and small enterprises.

The analysis of the current state of knowledge was based on the review of the literature published until the end of July 2022. The analysis covered full-text databases—EBSCO, Scopus, Web of Science—and university databases—University of Szczecin, Jan Kochanowski University in Kielce, University of Lodz and Lodz University of Technology.

As a result of searching these databases, 4,410,000 publications related to energy efficiency were obtained (the search criteria were narrowed down along with the subsequent steps of the research procedure), 1,340,000 publications on enterprise innovations (only eco-innovations were much fewer—1063 indications), over 287,500 publications related to building the competitive advantage of enterprises, and hardly any publications devoted to all of these phenomena.

Therefore, it was difficult to select articles that fit the research topic; hence, an appropriate procedure for combining the criteria for searching for literature had to be adopted (Figure 1). First, the literature items were identified by making a selection from the databases of works under the following slogans: energy efficiency and eco-innovations (1773 items). The next step was to add another criterion, which was the slogans SME and competitive, and we got 256 items. Of the resulting 256 items, a detailed analysis of these titles and summaries was performed, and finally 115 items were obtained, which are included in the article below.

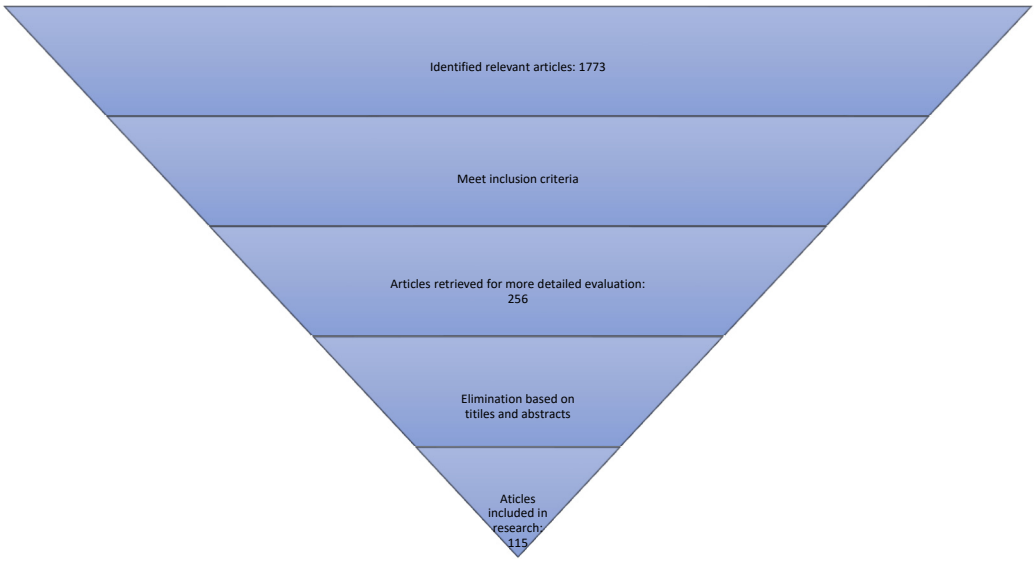

Figure 1. Procedure of literature review. Source: own graph.

On the basis of the literature on the subject, attempts were made to show the state of knowledge in the field of building the competitive advantage of enterprises and the implementation of eco-innovations, which has been dominant in recent years, as well as to indicate the necessity and direction of research in the area of combining these phenomena in the context of the energy efficiency of the economy.

A review of the literature on the subject and many years of work of the members of the research team for economic practice made it possible to identify research gaps. The above identification led the authors of the study to indicate, in the conceptualization phase of the research process, the eco-innovative activity of enterprises as an important factor influencing the building of their competitive advantage located in the broader context of the energy efficiency of the economy.

The scope of empirical research was defined in terms of: objective, subjective, spatial and temporal.

The objective scope of the research constitutes three groups of problems:

- Competitiveness of micro and small enterprises—factors shaping it and determinants of its occurrence;
- Energy efficiency as an aspect of building competitive advantage;
- Eco-innovation as a method of creating competitive advantage.

The subjective scope of empirical research consists of enterprises, i.e., economic entities separated: legally, organizationally, territorially, and economically, conducting commercial, service or production activities.

The spatial scope of the research relates to Poland—the research covered enterprises operating on its territory.

The time scope of the research covered the years 2019–2021.

The data used in this article came from a study on a broader issue of determinants of innovation development in micro and small enterprises. It was conducted using the technique of computer assisted telephone interviews. The selection of the sample was random and took place in the non-return drawing process. The sample was nationwide and covered n = 400 companies (300 micro and 100 small (the basis for distinguishing groups of enterprises was the number of employees: a micro-enterprise employs up to nine workers, while a small enterprise employs between 10 and 49 workers.)).

The research sample was randomized and stratified, taking into account the distribution by company size. Taking into account the size of the population of micro and small enterprises for the realized research sample, the maximum error did not exceed 5% at a confidence level of 0.95. Due to the non-proportional selection used (overrepresentation of

small enterprises), analytical weights were applied, which allowed generalizations to be made to the population of micro and small enterprises in Poland.

As part of the above-mentioned research, various aspects related to the development of innovative activities were identified, as well as the market potential of entities participating in the research. The structure of the questionnaire (identification of the conditions, the content of the questions) was the result and derivative of the scientific achievements to date and the specialist knowledge of the members of the research team in the field of innovative activities of enterprises and the impact of environmental and climate policies. The individual aspects were tested using two types of questions:

- Identification of facts consisted in the use of questions to select individual possibilities (facts). Questions of this type were used, for example, in relation to indications of investments in energy-saving solutions (in the case of indications for the implementation of eco-innovation solutions, the Cronbach's alpha internal consistency test was carried out. Taking into account the fact that the data used for the analysis came from a study covering a broader spectrum of issues, including eco-innovations other than those related to energy efficiency, all indications were taken for the consistency test. The coefficient reached a value of $\alpha = 0.7590$, which means that the internal consistency of the questionnaire in the part concerning indications for the implementation of eco-innovations is acceptable and entitled to further analysis. In addition, an assessment was made of the adequacy of the selection of input variables for factor analysis using the Kaiser–Mayer–Olkin coefficient. The achieved value of 0.64 signals the validity of the factor analysis);
- Identification of entrepreneurs' attitudes towards innovative activities and assessments of the market situation of companies was performed using the 5-point Likert estimation scale. It is a scale commonly used in questionnaire surveys, used to assess the degree of acceptance of a given phenomenon or fact, opinion on a given topic or attitude towards problems. The choice of the scale was dictated by its simplicity, both in terms of application and the interpretation of the results.

Some of the identified determinants of innovative activity considered to be the most important on the basis of the literature review were then analyzed in the process of empirical data analysis using logistic regression. This was used to assess the probability of success or failure, understood as the implementation or non-implementation of eco-innovations (dependent variables), depending on the presence of certain parameters on the part of enterprises that make up the model (independent variables). The results obtained in this way were then subjected to interpretation and expert assessment of the members of the research team.

3. Results and Discussion

3.1. Competitiveness of Micro and Small Enterprises

The Small and Medium-sized Enterprise (SME) sector plays an important role in national economies in terms of generating Gross Domestic Product (GDP) and workplaces, as well as stimulating economic growth. The fact that the group of micro and small enterprises distinguished from the SME sector was covered by the study described in this article was dictated by several reasons. In Poland, SMEs constitute 99.8% of the total number of enterprises, of which micro entities have a share of 97% [33]. High flexibility and efficiency in operating on the market allows micro and small companies to effectively compete with larger entities. These entities, however, face many barriers to functioning and building a competitive advantage, both internal (e.g., limited financial and human resources, lack of the possibility to carry out research and development works) and external (e.g., complicated and restrictive regulations concerning running a business or gaining capital through EU funding). The specificity of managing micro and small enterprises results from the characteristics of these entities and determines the choice of limited strategies of action and competition, also in the area of eco-innovation. The entrepreneur's personal independence means that he knows all the problems related to the functioning of his

business, but at the same time he is focused on their ad hoc solutions and there is a lack of orientation towards the future. The company is often the only source of income for the entrepreneur and their family, hence the avoidance of ventures that may bring great benefits in the future, but are burdened with greater risk, combined with a relatively greater involvement in the company's operations. Limited access to sources of financing activities does not allow for the selection of more advantageous operating strategies, and the inability to hire specialists, largely due to limited financial resources, means that the entrepreneur's choices are often intuitive and therefore burdened with greater error [34]. Micro and small entrepreneurs, therefore, largely manage organizations based on individual characteristics and level of knowledge or sensitivity.

The listed characteristics of micro and small entrepreneurs determine their behavior and attitudes—and differentiate them from medium and large companies. These notions are important, because the functioning of enterprises in a globalized world, characterized by high turbulence and unpredictability, forces constant adaptation to changes. Such attributes are closely related to competitiveness, the adaptation of companies to operate under unstable conditions and the ability to predict the direction of change in order to stay on the market [35]. One of the concepts linking the influence of globalization on the competitive position is the phenomenon of the so-called 'hyper-competition' [36], which consists of a gradual limitation of the possibility of gaining a competitive advantage by means of long-term factors. On the other hand, the role of time factors is increasing. This assumes that enterprises should take advantage of the opportunities resulting from the disturbances in the constantly changing market and the use of the resulting market opportunities. Actions aimed at maintaining the existing competitive advantages, due to their temporary nature, do not lead to development. Therefore, an important area is the identification of factors that determine the competitiveness of micro and small enterprises.

The competitiveness of enterprises and its determinants have long been the subject of research by business researchers and practitioners. Competitiveness is a multidimensional concept, considered at the macro (economy), meso (sectors) and micro (enterprises) levels [37]. Competitiveness at the macro and meso levels is closely related to the drive or the determination of companies to dominate the market, as it is companies, not nations, that directly compete on international markets [3]. They generate effects on a small scale individually, but taking into account the participation in the structure of national economy entities, they create value at higher levels of aggregation, i.e., sectors and economies.

Competitiveness can be understood in two ways: as an attribute, characteristic, result or outcome; or as a process of reaching a characteristic, attribute, result, outcome, which is competitiveness, which is synonymous with the implementation of the process of competing, i.e., gaining a competitive advantage [38]. In the attribute sense, therefore, competitiveness means the ability to compete, and thus to act and survive in a competitive environment [39], or the ability to efficiently achieve goals in the market arena of competitiveness [40].

In terms of the micro (at the company) level, competitiveness is understood as the enterprise's ability to:

- Design, manufacture and/or market products better than those offered by competitors, taking into account prices and non-price features [39,41];
- Innovate and be flexible, manifested in gaining a competitive advantage [42];
- Combine its resources and capabilities to build value-added competencies [43].

In the dynamic aspect, the company's competitiveness can also be seen as the basic ability to perceive changes in both the external and internal environment and to adapt to these changes in such a way as to guarantee the long-term functioning of the company [44].

The competitiveness of micro and small enterprises can be influenced by many factors, both external and internal, with internal sources of competitiveness believed to be dominant. External conditions create an environment in which enterprises can gain competitive advantages, but it is up to the company to decide whether it will use the opportunity to gain a competitive advantage or not [45].

The constantly changing market environment and the switch from local to international–global competition mean that the bases for determining competitive advantage are: speed and flexibility of operation, quality of the offer, being a pioneer and being active in networking. In this context, attention should be paid to the internal distinguishing features of companies from the SME sector, which may contribute to the emergence of competitive advantage within these entities based on the above-mentioned aspects. In the strategic area, these are: sensitivity to environmental impulses, flexibility, and the ability to react quickly [46,47], as well as the development of professional skills in areas giving the possibility of ensuring a long-term competitive advantage [48]. In the operational area, it is possible to distinguish, among other things, better matching to the needs of customers and providing them with greater added value [49]. Another important aspect is obtaining benefits resulting from teamwork and own and employees' competences, own network of contacts and creating a cooperation network [48,49].

Ambastha and Momaya [39] focused on the main sources of competitiveness at the enterprise level and classified the literature related to competitiveness under the asset–process–performance (APP) concept. Their approach covers two strategic levels: resources and performance, and processes. The authors suggest that a company's competitiveness depends on the combination of tangible and intangible resources and processes in the organization that can be called 'sources of competitiveness'. Competitiveness processes include strategic management and human resource management processes, operational and technology management processes. Competitive performance manifests itself in quality, productivity, cost, technology, and international results.

A comprehensive approach to SME competitiveness factors combining external, internal and entrepreneur-specific factors has been developed in several models, including those of Man et al. [6], Sirikrai and Tang [8], and Chew et al. [9]. For example, Man et al. [6] identified four elements of SME competitiveness, i.e., external factors, internal factors, the entrepreneur profile, and firm performance. The most critical for the competitiveness of SMEs are entrepreneurship factors (entrepreneurial attributes), such as experience, knowledge, skills, and goal orientation.

This model takes into account three dimensions of the company's competitiveness (resources, process, results) in relation to the four attributes (long-term orientation, controllability, relativity, dynamism).

Sirikrai and Tang [8], on the other hand, proposed a model of SME competitiveness that combines external drivers based on industrial organisation theory, internal drivers derived from a resource-based view and financial and non-financial factors of firm's performance. In the model of Chew et al. [9], the competition strategy for SMEs is based on strategic alliances, innovation, and differentiation.

These views are consistent with Prahalad and Hamel's [50] concept of key competences as the source of the competitive advantage that originated from the resource trend and the concept of dynamic capabilities of the organization [51]. Key competences are considered as the ability of an organization to collectively learn and accumulate knowledge—and to translate the accumulated resources, skills and experiences into new products and processes. Dynamic abilities, on the other hand, allow organizations to integrate, reconfigure, renew, and restore resources and capabilities in response to a changing environment, so as to achieve and maintain a competitive advantage [51,52].

Innovation plays a significant role in building the competitive advantage of companies [4,53], and is one of the elements of the company's dynamic abilities. By introducing innovations in various areas of activity, the productivity, efficiency, and quality of work are improved. This, in turn, translates into an increase in the efficiency and effectiveness of the company's operations. These effects affect both directly and indirectly the competitiveness of the enterprise. According to SME research, innovativeness can help small companies successfully build a competitive advantage. For example, this may be driven by their advantages over large firms in terms of greater flexibility, more responsiveness to market changes [54], or the lack of conflicts of interest at the owner–manager

level [55]. The innovativeness of SME companies depends on both internal factors (innovation potential) and the conditions in their immediate and distant environment. In spite of many features supporting innovation growth, SMEs have limited resources at their disposal; hence, external factors are also of particular importance. This situation often prevents them from translating their ideas into practical implementations on their own. This applies in particular to the implementations of innovations, in the case of which, due to the scale effect (the cost of implementation is not scalable downwards), the smallest economic entities have limited possibilities of financing innovative activities. Few small and medium-sized enterprises are able to use their innovative potential in a long-term and sufficiently competitive manner [56]. For this reason, in the case of micro and small enterprises, effective imitation, as it does not require such large financial outlays (developing solutions does not require, for example, research and development works), may turn out to be a factor increasing the competitiveness of these entities.

In recent years, in the context of building a competitive advantage based on innovation, more and more attention has been paid to the need to adapt to the requirements of the broadly understood 'pro-ecological policy'. The pro-ecological activities of enterprises are determined both by the need to adapt to national and EU regulations regarding environmental protection, but also by changes in consumer preferences caused by the increase in environmental awareness of the society and the pressure they exert on enterprises.

Some of micro and small entrepreneurs perceive the element of ecology as generating more costs and being associated with difficulties in running a business than as an opportunity to gain a competitive advantage. Still, building a competitive advantage based on eco-innovations may manifest itself in various dimensions that positively interpenetrate [57]. According to Forsman et al. [58], the implementation of ecological innovations may lead to the generation of advantages with respect to market, image, risk, and business efficiency.

Market advantage, manifested by an increase in sales and market share, is especially evident in the case of early market entry [59]. On the other hand, it should be borne in mind that eco-innovations are often more expensive to implement than conventional solutions, and not all consumers may be willing to pay a higher price for green products or services.

Creating an environmentally friendly image of an enterprise may contribute to building a competitive advantage with the growing environmental awareness of consumers. Adapting activities and offers to the ecological preferences of consumers may lead to an increase in demand for the company's products and to strengthening of the company's position on the market. Conscious consumers are looking for companies offering such products and services, and are also willing to pay more for them, especially if doing so is associated with additional values and perceived benefits on the part of the customer.

Competitive advantage related to risk relates to the sources of financing innovation in the company. According to Newbert et al. [60], the company's competitive position is partially dependent on its financial resources. The problem of financing innovative activities is particularly visible in the case of micro and small enterprises. The participation of foreign capital in financing eco-innovation generates additional costs that reduce the competitive advantage. A chance for these companies may be the use of funds under EU programs supporting the implementation of ecological solutions in the SME sector, including making informed investment decisions towards more sustainable economic activities. To qualify as sustainable, an economic activity must make a significant contribution to at least one of the six environmental objectives—defined as: (i) mitigating climate change; (ii) adapting to climate change; (iii) sustainably using and protecting water and marine resources; (iv) transiting to a circular economy; (v) preventing/minimizing pollution; (vi) protecting or restoring biodiversity and ecosystems, and not causing significant damage to any of the above environmental purposes [61].

Ecological innovations can stimulate the competitiveness of enterprises in terms of business efficiency (understood as the ratio of the obtained effects to the expenditure incurred) thanks to lower costs and more efficient processes [59], as well as a reduction in

environmental fees and possible penalties [62]. In the case of micro and small companies, efficiency may not be a reliable indicator of development [63], while as a result of the implementation of eco-innovations, an increase in the level of sales can be noticed in these companies.

The considerations outlined above point to the need to increase the awareness of micro and small business entrepreneurs of the existence of a variety of circuits of economic and social life in which eco-innovations can be introduced. As a result, there is also a need to identify eco-innovation as a source of gaining and maintaining competitive advantages for entrepreneurs. Note that the following part of the consideration of eco-innovation is largely related to the resource source of gaining competitive advantage by entrepreneurs.

3.2. Eco-Innovation as a Method of Creating Competitive Advantage

Air pollution, water pollution, soil pollution, ozone layer degradation, acid rain, renewable resource depletion, waste management and erosion are the main environmental issues faced in every industry [16]. Because of these environmental effects, which are the main concerns of almost every industry, firms frequently search for some innovative sustainable approaches to be incorporated within their business processes. Eco-innovation is an eco-friendly and sustainable solution for industry that is able to increase a firm's sustainable financial performance, sustainability, and performance with respect to Sustainable Development Goals (SDGs) [17–20].

Directing economic life towards 'green growth' [11] leads to better economic results in many countries and the emergence of new, much more ecological competitive advantages [12,13], especially thanks to the intensification of absorption and diffusion of eco-innovations.

The phrase 'eco-innovation' originates from the mixture of two words: 'eco' and 'innovation'. The terms 'eco' and 'innovation' combined mean 'environmentally sustainable' and 'contemporary introduction'. The third industrial revolution incorporated eco-innovation, which was expanded in the fourth industrial revolution, which focused on innovation and sustainability. According to the Club of Rome's study Limits to Growth and the United Nations' Brundtland report (1987), sustainability is a critical way of saving scarce capital for continual prosperity into the future generations [21,27].

P. James, in his landmark book on creativity and sustainability, described eco-innovation as new products and processes using industrial manufacturing techniques that will deliver advantages to both consumers and firms, while dramatically minimizing ecological impacts [22]. K. Rennings, in turn, extended the concept of eco-innovation by introducing three dimensions: technological innovation, social innovation, and institutional innovation [64–66].

The most common and systematic definition of eco-innovation was given by Kemp and Pearson, according to which "eco-innovation is the development, adoption or use of a product, production process, service, management or business method that is innovative for an organization (developing or adopting it). This results in a reduction of environmental risk, pollution and waste throughout the life cycle" [21]. However, the notion of eco-innovation has been further expanded based on the study of its specific dimensions, assisting in accelerating sustainability and overall growth [14,15,24,27].

Various approaches to the definition of eco-innovations demonstrate that eco-innovations can be perceived both narrowly [67] and broadly [68].

The narrow approach to ecological innovations takes into account three important definitional aspects: it is based on the subjective perception of innovation (innovation is a novelty for the enterprise), covers only implemented innovations (not actions initiated to reducing environmental burdens), and reduces the harmful impact of production activities on the environment.

A broad approach to ecological innovation goes beyond the boundaries of the enterprise and covers wider social systems that stimulate changes in the existing socio-cultural norms and institutional structures. In this case, actions taken by individual enterprises

translate into meso and macro effects. They allow for many positive environmental, health and social effects. Moreover, they are an excellent instrument for supporting green growth/development, and therefore are much less dependent on, and in some cases even independent of, the consumption of non-renewable resources. These activities dematerialize economic growth, both production and consumption, generate new production and consumption patterns, and are associated with many new concepts, such as clean technology instead of cleaning technology, as well as incorporating product life cycle and technology "cradle to cradle". Such approaches minimize waste and reduce the consumption of materials and energy. Overall, it can be said that eco-innovation is accelerating the pace of change for the better.

Just as there are many definitions of eco-innovation, there are many types. Eco-innovations, in accordance with current standards, are not only aimed at implementing or significantly improving the previously used technical solutions. At the same time, they must meet the criterion of economic profitability, be socially acceptable, and meet environmental standards. Nowadays, when implementing a sustainable development model, none of these spheres can become an end in itself, but must create an integral and coherent whole. Therefore, emphasizing only the ecological character of innovation is often merely marketing, caused by the desire to improve the image of the company and based on the growing level of ecological awareness (for more on greenwashing, refer to [18]). Referring to the research by Arundel and Kemp and others, five dimensions of eco-innovation are indicated, i.e., product, process, technological, organizational, and marketing [27,28,69,70].

Product eco-innovations are innovations that respond to business and government environmental requirements to achieve long-term sustainability and improve resource efficiency and environmental performance. Herein, environmental gains are maximized during the product life cycle, and the applied engineering of ecological products favors a climate in which eco-products or the entire eco-production process are created [23,25,28].

Process eco-innovation is a complete or partial change in factors or properties of production processes and the proportions between them. They include, for example, processes utilizing especially reactive technologies (called 'end-of-pipe' technologies) and preventive technologies (such as integrated technologies or so-called 'cleaner technologies', the purpose of which is to prevent pollution) [28,66,71].

Eco-technology innovations are the main 'player' in providing knowledge on detailed material efficiency plans and keeping records and information on environmental technologies. Environmental solutions reduce costs and increase the competitiveness of enterprises by minimizing outside sources of energy and other used resources, and as a result lead to the elimination of waste and pollution [28,72].

Organizational eco-innovations result from management processes, systems, or techniques. They are aimed at increasing the overall environmental balance—that is, improving and maintaining environmental benefits and the quality of resources, as well as extending corporate social responsibility [26,72].

Marketing eco-innovation refers to innovative methods of incorporating environmental aspects into communication and sales campaigns. This includes, for example, the promotion of environmentally sustainable goods by carrying out a more detailed consumer analysis, personal contact with customers and the use of marketing techniques that meet the needs of environmentally sensitive customers [24,72]. The latest approach to innovation proposed in the Oslo Manual indicates product and business process innovation. Business process innovations concern six different functions of a company, as identified in the management literature. Two functions are related to the company's core activity, i.e., manufacturing and delivering products for sale, while the remaining functions are related to supporting activities. The taxonomy of business functions proposed in this handbook reflects the categories of product, process, organizational and marketing innovations proposed in the previous edition quite well [73].

Other classifications include the breakdown of eco-innovation from the point of view [74] of:

- Eco-innovation design—characterized by the development of additional solutions (elements) to improve the quality of the environment, changes in the production and use subsystems (eco-efficiency and optimization) and system changes (re-designing systems for the production and use of products or services via the employment of eco-efficient solutions);
- Eco-innovation user—characterized by the acceptance of eco-innovation by the user;
- Products and services—characterized from the perspective of the supply chain by changes in the processes of manufacturing products or services and changes in the processes of delivering products and services resulting from the introduction of eco-innovations;
- Governance—characterized by institutional solutions in the public and private sectors that are conducive to the implementation of eco-innovations.

According to Carley and Spapens [75], there are many arguments in favor of using eco-innovation. These include:

- Less waste and pollution—eco-innovations allow for the re-use of the same resources, resulting in the generation of less of them;
- Better quality of life—eco-innovations lead to a reduction in resource consumption, but at the same time increase the quality of the benefits obtained;
- Jobs and social justice—eco-innovations increase the share of human capital in the economy and stimulate the creation of new jobs, thus reducing unemployment;
- Benefits for business, market attractiveness—eco-innovations reduce many costs, avoid various categories of environmental fees, and create more effective processes;
- Profitability—savings in the field of resources used, related to the reduction of energy and raw materials consumption;
- Competitiveness—eco-innovations mean an increase in quality, better technologies, processes and products that have more and more market opportunities.

From the point of view of eco-innovation in the field of energy, the most commonly used are:

- Photovoltaic cells, solar panels, biogas plants, new generations of windmills, geothermal installations, recuperators, heat pumps—eco-product innovations;
- Distributed energy, intelligent energy management systems in buildings, trigeneration, energy efficiency—process eco-innovations;
- Solar farms, wind farms, implementation of environmental management systems—organizational eco-innovations;
- Modern awareness campaigns and advertising pro-ecological solutions in the energy sector—eco-marketing innovations.

Often, these solutions overlap and condition each other, functioning as systems that contribute, inter alia, towards building competitive advantage. However, to make it possible, companies must have a certain possibility of implementation or the ability to implement innovation, which is conditioned by the presence of a number of parameters. These variables (174) define:

- Sources of innovation, infrastructure in terms of adaptation to innovation, soft innovation management—Indicator A (WA): Infrastructure and management—includes 47 variables—this indicator concerns the inputs and resources (financial, human, technological) of companies significant from the point of view of innovative activity;
- Employment, cooperation, ICT technologies—Indicator B (WB): Relational capital—includes 28 variables—this indicator mainly concerns involvement and cooperation within innovative processes;
- Innovative changes, innovative strategies, innovative costs—Indicator C (WC): Return on innovation—includes 80 variables—this indicator mainly pertains to the introduction of innovative solutions and the related results;

- The environment of enterprises, which is defined as factors influencing enterprises, but remaining beyond their direct influence (factors positively influencing enterprises, as well as negative stimuli). Indicator D (WD): Innovation Environment—includes 19 variables.

All of these variables are designed to measure the innovation maturity of Polish companies over a certain period of time. As shown by the Innovation Monitoring of Polish Enterprises, 30.4% of all Polish enterprises in 2017–2019 conducted innovative activities, i.e., introduced at least one product or business process innovation. These companies constitute the greater part of all innovatively active companies, among which there are also entities that started innovative activity, but discontinued it or gave it up, or did not complete it in the analyzed period. All told, companies active in innovation accounted for 34.7% of all enterprises in the analyzed period. Importantly, the percentage of innovative and actively innovative companies is significantly related to the size of the company—the larger the company, the greater the percentage of companies classified as innovative or active in innovation.

The results of the three editions conducted in 2018–2020 were very similar. Therefore, it can be concluded that the level of innovation in Polish companies is rather stable and is conditioned by similar variables. In addition to the size of enterprises, the innovative activity of companies depends largely on the attitudes of their management staff, which in the case of 70% of all innovatively active companies, is the main initiator of the innovative attitude. In addition, the source of innovation for Polish companies is the immediate environment, i.e., customers, suppliers, and competitors (54% of all innovation-active companies. The following are indicated as sources of company innovation:

- Work of creative employees from outside the research and development team (20% of all innovation-active companies);
- Work of own research and development team (13% of all innovatively active companies).

As the results of the conducted research show, more than two-thirds of innovatively active companies systematically look for new ideas to conduct innovative activities, and only a slightly smaller percentage of such companies have developed effective mechanisms for assessing the correct identification of their clients' needs. Undertaking the innovation process is often determined by an internal imperative, which indicates that without innovation, the enterprise is unable to maintain an appropriate level of competitiveness. Its significant determinants include the search for the cost-effectiveness of the company's operations. Invariably, the approach to innovative activity determines the attitude of the owners and management of the enterprise towards it, as well as the skillful release of employees' creativity. The age of the company or its marketing activity is also important [76].

As noted, the measures taken by companies to implement eco-innovation contribute to their building of competitive advantage. Importantly, they have a much broader impact. By applying more efficient technologies or production processes, these companies contribute, among other things, to the efficient use of energy, a resource that is crucial to the economies of entire countries.

3.3. Energy Efficiency as an Aspect of Building Competitive Advantage

The above-presented approach to competitiveness or the use of eco-innovation by enterprises to build this competitive advantage would not be realistic if not for a holistic view of energy efficiency. It should be emphasized that mainly in this article we consider these issues from the level of enterprises. However, the issue of energy efficiency applies to both enterprises and the economy as a whole. This is due to the regulations at the level of individual countries, but also the structures into which these countries enter, such as the European Union or NAFTA. This proves that the entire modern world is struggling with the problem of energy efficiency. Additionally, the occurring scarcity of resources and the dynamically growing demand for energy is a significant challenge facing the global economic system. This is especially visible today during the crisis caused by Russia's war against Ukraine. Therefore, a key factor towards ensuring energy is

efficient resource recovery by converting waste streams into energy, chemicals, and other valuable materials [77]. Examples include activities such as creating energy waste as an evolving element of the management system [78], incinerating waste to recover energy from it [79], or even utilizing renewable energy [80], or applying technologies that increase the recovery of resources from waste streams [81]. This efficient resource recovery follows the implementation of commitments to reduce air pollutant emissions by current members of the European Union since the 1970s. Transforming the commitments into an emission control policy through the development of EURO directives or standards has led to an improvement in air quality. However, despite the knowledge of the subject in theory and practice, the aspects of energy efficiency itself are always up to date with the development of technology and important for building a competitive advantage of enterprises. It manifests itself in the implementation of, for example, pro-ecological restructuring of enterprises [82].

Energy demand increases with the income of individual countries, and it does not matter whether we are talking about low- and middle-income countries or high- and middle-income countries. Regardless of the level of income, countries have undergone a dynamic industrialization process that has resulted in significant economic growth, but also in population, which has resulted in appropriate energy demand [83]. The leading example of the increase in energy demand is the Chinese economy. In the years 1995–2015, China recorded an increase in GDP by 502% [84], industrial value added in the secondary sector by 600% [85], and population by 14% [86]. To date, unfortunately, China's energy sector still relies heavily on solid fossil fuels for electricity and heat production and diesel for road transport [83]. This results in a constant upward trend in the emission of air pollutants and greenhouse gases [87–89].

On the basis of an analysis of such examples and the situation in the economies of European countries, the European Union (EU) took steps to improve this situation by updating the relevant directives. As a result of these changes, energy efficiency is recognized as a key policy area for achieving ambitious climate change mitigation goals and the security of the energy supply in this regard. At the end of 2019, the European Green Deal was presented to the EU (European Commission, 2019). Thanks to this, the EU has increased its climate ambitions, and aims to achieve climate neutrality by 2050. The European Green Deal, by amending important legislation on climate and energy (EED—Energy Efficiency Directive) [90], assumes a reduction of greenhouse gases by 2030 by at least 55% compared to 1990. After updating the EED, many EU Member States have implemented Energy Efficiency Obligations (EEO), which require companies to deliver a certain level of energy savings by selecting from a set of agreed actions [91].

It is worth mentioning that with this new regulatory framework, significant socioeconomic, demographic, and technological changes have been observed over the past 40 years, in particular in high-income countries and pan-national unions (such as the EU and the US). Their effects include the expansion of natural gas in various end-energy applications and energy conversion plants, a greater share of renewable heat sources (biomass/biogenic fuels) and nonthermal energy (photovoltaics, wind and tidal energy) [83] in national fuel baskets, as well as energy improvements in the road transport sector [92]. The effect of these activities is the evolution of air pollutant emissions [93], which has contributed to the reduction of sectoral air pollutant emissions. These activities have not only improved air quality in Europe, but have also led to positive changes in other regions of the world, especially due to the need to meet EURO standards in exports [94,95].

Referring to the above solutions, it is worth asking how these constantly occurring changes affect the broadly understood innovation of the economy. Compliance with the new legislative regulations requires enterprises to take several actions that go beyond the current standards. To meet the challenges of the environment, the turbulent economy, and random events, they have introduced modernizations and innovations taking into account environmental requirements. Wen et al. [29], using panel data for 79 countries from 1995 to 2017, showed that renewable energy and energy efficiency had a positive impact on innovation. The evaluation was carried out based on the number of trademarks and patent

applications, taking into account macroeconomic, financial and institutional variables. Their results indicate that the regulation of renewable energy encourages technological innovation. For example, the impact of investment, trade and human capital on technical innovation is enhanced by the use of renewable energy.

One of the real examples of this effect is the activity carried out in Canada. Research by Bataille and Melton [96] indicated that there was an improvement in energy efficiency of approximately 2% compared to Canadian GDP over the decade (2002–2012), which positively influenced total employment in this period by approximately + 2.5%. As can be seen, improving energy efficiency encourages the reallocation of limited productive capital from relatively capital-intensive energy supply sectors to the rest of the economy, which is usually more labor-intensive. Another example is the results of energy audits in Belgium, Japan, Sweden, and Italy [97]. The researchers indicated that around 50% of the final energy consumption of industrial SMEs in Sweden was found in production processes, but only 20% of the energy efficiency potential was in production. This shows where eco-innovation should apply.

The above considerations led to the conclusion that the more energy-intensive the sector is, the more energy efficiency is important for its long-term prospects; therefore, eco-innovation gains in importance [98].

Poland, as a member of the EU, also takes measures to improve the efficiency of resource use in the economy. For example, the document "State Ecological Policy 2030" [99] recommends changes in the shaping of business models and areas of operation of enterprises. One of the important issues is the implementation of eco-innovations, which contribute significantly to increasing the efficiency of resource use. They also have a positive effect on reducing the negative impact of human activity on the environment [100].

However, we must remember the problem related to its implementation in Polish companies. For them, eco-innovation is not always a way of building a competitive advantage. This is primarily related to operating costs. These have priority when making investment decisions. This is because companies initially reduce the energy and material consumption of their processes and then water consumption and waste generation. Thus, eco-innovations are undertaken somewhat further downstream.

The following postulates follow from the above considerations:

- The environmental footprint must be considered for all or selected elements of the processes related to extraction, transport, production, use and withdrawal of resources [101];
- Ecodesign should become an element of decision making in companies that determine the way of managing resources. Products should be designed and manufactured in such a way that their use has the lowest possible impact on the environment, including ensuring reduced energy consumption;
- Ecodesign should also be used to improve existing products, services, or processes [101], thus allowing a reduction in the negative environmental impact at each stage of the product life cycle [99].

Implementing the above postulates leads to changes in business models that enable the transformation of the enterprise to a circular economy [101]. Economic entities undergoing such changes must also aim, in addition to obvious revenue, at enhancing or, at the very least, not diminishing the natural environment. The very design of the activities of companies, already at this stage, should allow a smoother implementation of all environmental policy recommendations. In effect, this will lead to the entire process of green production, ending with the recovery of materials and energy from withdrawn products and, as a result, reducing the environmental impact.

3.4. Hypothesis Development

The analysis of the literature carried out for the purposes of this article showed that among the factors influencing undertaking innovative activity, three variables play a special role: the size of enterprises, the market situation of enterprises and the interest

of the management staff in the company's activity (widely understood attitude towards market competition). It should be noted that these factors should be considered collectively. Only then will the effect in the form of the undertaken innovative activity take place. Based on the above foundations the following research hypotheses were formulated:

H1. *The size of the company determines the activity in the field of investments in eco-innovations (small enterprises invest in eco-innovations more often than micro-enterprises).*

H2. *The current market situation of the enterprise influences the decision to invest in eco-innovations.*

H3. *The interest in the development of the enterprise by the management staff influences the investment in eco-innovations.*

The null hypotheses assume that individual independent variables do not differentiate the involvement of enterprises in the implementation of eco-innovations.

The verification of the research hypotheses was carried out on the basis of the results of the empirical research.

3.5. Survey Results

The market success of companies and their ability to compete with the competition depends on a number of factors related both to the ability to shape their resources in accordance with the assumed development goals and the ability to take advantage of market opportunities, but also to take into account macro-economic and political challenges and trends. The last point undoubtedly includes the environmental and climate challenges that the Polish and European economy will face in the coming years. These challenges result from environmental and climate policy at the EU and national level and relate, inter alia, to a number of areas interconnected with the broadly understood notions of resource management and energy efficiency, including the reduction of greenhouse gas emissions. As a result, the need to develop sustainable products, services and business models will be the norm and will transform consumption patterns.

The ability of enterprises to capture such opportunities and take into account challenges will determine their competitive potential and advantages over other enterprises operating in the market. A special role is played by smaller entities that play a key role in national economic development through holding a significant share in the domestic product, and by creating new jobs, as well as through their productivity, investment outlays and entrepreneurial and innovative activities that are conducive to economic development [102].

The starting point for analyzing the potential of companies to use environmental challenges as a source of building their competitive advantage is the analysis of their market situation. As can be seen from the data below (Table 1), few enterprises, especially micro-enterprises, are active on international markets. This aspect is important, because there is a relationship between the activity of companies on international markets and their innovation. Innovative companies are internationalized more often than companies not conducting such activity, i.e., they derive income from the sale of products or services on foreign markets [103]. Taking up competition on foreign markets implies the necessity of going beyond the standard offer and creating new, attractive products and/or services. It is worth emphasizing that micro-enterprises are characterized by significantly lower activity on foreign markets. Hence, most of the companies covered by the study operate on the domestic or regional market, and the influence of the size of the company is visible again in this respect, because small enterprises relatively more often indicate the national scope.

Table 1. The scope of activity of the surveyed enterprises.

	Total (n = 400)	**Micro Enterprises (n = 300)**	**Small Enterprises (n = 100)**
Local (county area)	17.9%	18.3%	4.0%
Regional (voivodeship area)	41.3%	41.7%	27.0%
National	38.6%	38.3%	49.0%
International	2.2%	1.7%	20.0%

More than three-fourths (77.8%) of all enterprises participating in the survey are at the stage of consolidating their activities, indicating the stabilization of their development (Table 2). Small companies declare so slightly more often, while a few micro-enterprises indicate activity in the declining phase. Such information is important, because this phase is not conducive to innovative development, as it is usually associated with a permanent reduction in operational efficiency. The remaining companies (almost one-fifth of the surveyed sample) stated that they were in the phase of dynamic growth.

Table 2. Development phases of the researched enterprises.

	Total (n = 400)	**Micro Enterprises (n = 300)**	**Small Enterprises (n = 100)**
Start-up phase	0.3%	0.3%	0.0%
Dynamic growth phase	19.6%	19.7%	19.0%
The stabilization phase	77.8%	77.7%	81.0%
Decline phase	2.3%	2.3%	0.0%

Almost half of the surveyed enterprises (45.9%) indicated that in the 3 years preceding the survey, their market situation did not change, while 20.1% of the polled companies stated that they experienced its deterioration (Table 3). However, it should be borne in mind that this period coincides with the time of the COVID-19 pandemic, which had a negative impact on the entire market to varying degrees. Although there were industries that experienced the effects to a greater extent than others, taking into account the links between industries in the modern economy, it must be remembered that obstacles in the operation of some industries may affect others. When considering the impact of a pandemic, one should therefore take into account such effects as:

- Collapse in demand related mainly to the restrictions on mobility or the activity of selected industries introduced by states. This covers the internal markets of the affected countries, as well as international trade;
- Disruptions in supply chains; this effect was most acute in the case of strong international ties, but it was also felt at the level of internal markets;
- Operational downtime imposed administratively or resulting from a lack of labor resources (e.g., as a result of reduced mobility, the need to take care of children, contamination of staff or employees' health concerns);
- Unfavorable price trends (due to weakening demand or disruptions in supply chains);
- Deterioration of the financial situation of recipients—companies falling into problems as a result of the crisis (possible payment gridlocks) and people losing their jobs [104].

Table 3. Change in the situation of the surveyed enterprises in 2019–2021.

	Total (n = 400)	**Micro Enterprises (n = 300)**	**Small Enterprises (n = 100)**
Significant decline	0.0%	0.0%	0.0%
Slight decline	20.1%	20.7%	2.0%
No changes	45.9%	45.7%	53.0%
Slight increase	32.3%	32.0%	43.0%
Significant increase	1.7%	1.7%	2.0%

The smallest companies, among which more than two-thirds stated that they either did not experience any changes or experienced a deterioration of their situation, were particularly affected by the effects of the pandemic. This situation had a negative impact on the potential to implement innovations, where financial constraints are one of the main barriers.

Nevertheless, the positive self-assessment of the representatives of the surveyed enterprises regarding their current competitive position in relation to other companies is noteworthy (Table 4). Almost one-fifth (19.6%) of all entities described their current situation as being worse compared to the competition, and over half stated that it is as at least strong. This is important, as it proves that these enterprises have a pro-competitive attitude, which is necessary for the development of innovative activities.

Table 4. The current competitive position of the surveyed companies in relation to other companies.

	Total (*n* = 400)	**Micro Enterprises (*n* = 300)**	**Small Enterprises (*n* = 100)**
Very weak	0.0%	0.0%	0.0%
Weak	6.0%	4.5%	6.0%
Same	40.7%	40.3%	55.0%
Strong	50.9%	51.3%	37.0%
Very strong	2.3%	2.3%	2.0%

In the context of implementing innovations and, in general, developing the competitive potential of companies, it is important to see current interest in this aspect on the part of managers of the surveyed enterprises (Table 5). Although in total over three-fourths of the respondents indicated a strong or very strong interest, at the same time, over one-fourth (26.1%) could not define themselves in this aspect. Such an undefined position regarding the interest of people managing the development of companies may adversely affect their innovative potential, for which a proactive approach related to the search for ideas, ways of implementing them, or ensuring financing is essential.

Table 5. Current interest of the management staff in the development of the surveyed enterprises.

	Total (*n* = 400)	**Micro Enterprises (*n* = 300)**	**Small Enterprises (*n* = 100)**
Very weak	0.0%	0.0%	0.0%
Weak	0.6%	2.3%	1.0%
Hard to say	26.1%	25.0%	6.0%
Strong	68.8%	68.0%	58.0%
Very strong	4.5%	4.7%	35.0%

As shown by the results of the study (Table 6), enterprises are to a different extent interested in individual solutions that may contribute to limiting energy consumption. The most common are investments in energy-saving machines and devices. Of course, these are not always used for production; such investments can also be employed, for example, by service companies, and may be related to the replacement of office equipment with less energy-consuming equipment. This is mainly due to the cost approach—most small entities are interested in reducing costs—hence, with the necessary replacement of machines and devices, decisions regarding choice are about energy-saving rather than changing processes, including utilizing eco-designs, which do not give such quick savings. It is also quite common to limit meetings and business trips in favor of online contacts (largely due to the COVID-19 pandemic). In the case of small businesses, it is also very popular to optimize transport/deliveries, resignation from paper documentation in favor of electronic or use of reusable packaging (more than half of the indications each time). The least frequently implemented activities of enterprises are activities such as the use of low-emission cars or the implementation of eco-design. In the first case, however, it should

be considered that the scale of interest depends largely not only on the development of the technology itself, but also on the availability of infrastructure (charging stations) or state policy (subsidies for the purchase of cars). On the other hand, eco-design, due to its specificity, is reserved for manufacturing companies, and these were relatively few in the studied sample (only about one-fifth).

Table 6. Activities implemented by companies in accordance with environmental requirements related to the energy efficiency of the economy and the size of enterprises.

	Total (n = 400)
Energy-saving machines and devices	87.4%
Limiting meetings and business trips in favor of online contacts	84.7%
Transport/delivery optimization	69.7%
Resignation from paper documentation in favor of electronic	69.6%
Use of reusable packaging	51.8%
Increasing the use of secondary raw materials	38.0%
Implementation of energy management systems	25.0%
Generation of energy from renewable sources	24.0%
Eco-design	19.3%
Use of hybrid/electric cars	10.9%

The above-mentioned characteristics of the surveyed enterprises show that their market potentials (e.g., the development phase or the current competitive position) are nevertheless sufficient to influence particular areas of their competitive advantages. In the case of small enterprises, they seem to be slightly better informed, however, micro-enterprises are not without opportunity. Their size allows for more flexible adaptation to changing market circumstances, as well as changes or challenges inherent in the widely understood environment. Such circumstances, as mentioned above, include environmental and climate challenges, the manifestation of which is the desire to reduce the energy consumption of the economy (improve energy efficiency). A perfect example is the environmental policy related to the construction of alternative renewable energy sources—photovoltaic panels, which, with appropriate financial support from the state, allowed a huge number of small entities to carry out such investments.

For the needs of this article, a logistic regression analysis was performed. This made it possible to examine the dependence of dichotomous variables (understood as undertaking or not undertaking investments in eco-innovations) on the explanatory (independent) variables described above. As a result, the values of each dependent variable range from <0; 1>. The dependent variables in this analysis are the activities listed in Table 6.

The logistic regression analysis showed that there was a statistically significant correlation between the parameters of the model composed of the above-mentioned independent variables and the implementation of individual types of eco-innovation depending on them ($p < 0.05$). This shows that at least one of the explanatory variables was an important factor in the probability of most of the analyzed eco-innovations (dependent variables). This demonstrates a high probability of correct classification of the relationship between independent variables and success, understood as the implementation of specific types of eco-innovation. Therefore, it can be concluded that the regression parameters of the model are statistically significant. Only in the case of eco-innovation is there a negligible relationship. However, taking into account the importance of the findings of this analysis in the context of the implications, e.g., for planning public intervention, as well as for conducting further research, this solution has not been ruled out. It should be considered that the level of involvement of enterprises in this type of implementation is relatively low (see Table 7).

Table 7. The statistical significance of the relationship between the main determinants of innovative activity of enterprises and the implementation of eco-innovations related to the energy efficiency of the economy.

	Statistical Significance	Size of Enterprises		Change in Market Situation		Management Activity	
		OR	*p*-Value	OR	*p*-Value	OR	*p*-Value
Energy-saving machines and devices	$p = 0.00306$	1.460	0.0000	0.387	0.6500	1.095	0.0000
Limiting meetings and business trips in favor of online contacts	$p = 0.00000$	39.721	0.0000	0.555	0.0152	0.999	0.0000
Transport/delivery optimization	$p = 0.00008$	0.569	0.0000	0.295	0.0456	1.150	0.0000
Resignation from paper documentation in favor of electronic	$p = 0.00000$	6.751	0.0000	0.251	0.5457	0.988	0.0000
Use of reusable packaging	$p = 0.00000$	5.594	0.0000	0.942	0.2219	1.027	0.0205
Increasing the use of secondary raw materials	$p = 0.02963$	2.009	0.0000	0.748	0.0389	0.886	0.3805
Implementation of energy management systems	$p = 0.00000$	0.237	0.0000	0.526	0.0000	0.651	0.0016
Generation of energy from renewable sources	$p = 0.00000$	2.849	0.0000	1.969	0.0000	1.639	0.0000
Eco-design	$p = 0.29051$	1.011	0.0000	1.227	0.0339	1.222	0.0389
Use of hybrid/electric cars	$p = 0.01117$	0.707	0.0000	0.641	0.0020	0.759	0.0336

Tests of homogeneity of the distributions of the variables carried out for each of the assumed explanatory factors indicated that it is possible to speak of the presence of a strong relationship for each of them. Thus, the null hypotheses stating that the individual independent variables do not differentiate the involvement of enterprises in investment in eco-innovation are rejected. The strongest relationship was observed in the case of the size of enterprises, which means that as the size of enterprises changes (and, consequently, their financial and organizational potential increases), the chance of investing in e-innovation increases. Of course, this factor translates unevenly into the chance of individual innovations.

Investments in energy-efficient machinery and equipment, renewable energy production, increased use of recyclable materials or the use of reusable packaging are at most several times more likely to occur for small businesses compared to micro-enterprises. In the case of several eco-innovations (transportation/supply optimization, implementation of energy management systems, use of hybrid/electric cars) OR < 1, which means that micro-enterprises are relatively more likely to make this type of investment. This may be due to the fact that the innovative activity of enterprises is often subject to the impact of public policies (e.g., the availability of funding for certain activities from public programs, such as EU funds). In addition, for some eco-innovations, other factors should also be taken into account, such as the specifics of the business, which may determine the usefulness of certain solutions. For example, transportation and delivery optimization is particularly useful for manufacturing companies. In the sample surveyed for this type of implementation, manufacturing companies accounted for about 1/5, and these were only micro-enterprises.

The second most strongly correlated factor influencing investment in eco-innovation is the level of management interest in the company's operations (broadly defined as attitudes toward market competition). In this case, the p-value level for only one eco-innovation (increasing the use of secondary raw materials, *p*-value = 0.3805) does not allow the rejection of the null hypothesis. However, it should be borne in mind here that the use of secondary raw materials is, in principle, possible and legitimate in production processes. In other cases, increasing managerial interest in the operations of companies (broadly speaking, attitudes

toward market competition) may translate into an increased willingness to invest in eco-innovation. This is the case with investments in energy-efficient machinery and equipment, optimization of transportation and delivery, use of reusable packaging, renewable energy generation and eco-design. In other cases, other factors, such as the size of companies mentioned in passing, are possible influences.

Finally, for the third of the independent variables, i.e., changes in the market situation of companies, the p-value level for three eco-innovations (investment in energy-efficient machinery and equipment, abandonment of paper documentation in favor of electronic communication, use of reusable packaging) does not allow rejection of the null hypothesis. In addition, only in the case of two eco-innovations (renewable energy generation and eco-design) does increased management commitment translate into an increased likelihood of implementing specific solutions. This may be due to a stronger impact of other factors, such as those related to the potential of enterprises for specific investments conditioned, for example, by their size.

The above observations are confirmed by the results of the analysis of the correlation between the involvement of enterprises in the enactment of activities related to energy efficiency and their size (see Table 8). Some implementations show greater involvement of small entities (e.g., utilization of energy management systems or production of energy from renewable sources), while the use of others is dominated by the smallest companies (e.g., limiting meetings and business trips to online contacts, the use of reusable packaging or moving away from paper to electronic documentation). The observed regularity is the employment by the smallest enterprises of solutions that do not require additional outlays, but rather reduce the costs incurred. Although in the remaining analyzed examples of energy efficiency solutions we deal with a relatively even distribution of involvement in implementations in companies of various sizes, the significant impact of the related organizational and financial potential is noticeable. Therefore, the correctness according to which the size of enterprises is a factor that should be considered as a significant determinant of the implementation of eco-innovation is confirmed [103].

Table 8. The implementation by companies of activities compliant with environmental requirements as related to the energy efficiency of the economy and the size of enterprises.

	Micro Enterprises (n = 300)	**Small Enterprises (n = 100)**
Energy-saving machines and devices	86.0%	70.0%
Limiting meetings and business trips in favor of online contacts	62.0%	11.0%
Transport/delivery optimization	29.0%	87.0%
Resignation from paper documentation in favor of electronic	60.3%	24.0%
Use of reusable packaging	17.0%	11.0%
Increasing the use of secondary raw materials	8.7%	10.0%
Implementation of energy management systems	6.0%	33.0%
Generation of energy from renewable sources	6.3%	49.0%
Eco-design	5.3%	7.0%
Use of hybrid/electric cars	0.7%	3.0%

The financial potential that determines, at least in some cases, the implementation by enterprises of solutions to increase energy efficiency, apart from the size of the companies, is also a derivative of their current market situation. In this case, we are dealing with a regularity according to which favorable changes strengthen the attitudes of enterprises in this respect. In such situations, the readiness to incur expenditures on this type of investment increases, while in situations of identified change in the market situation to their detriment, actions that do not require expenditures are undertaken. Regardless of the context of implementing solutions leading to a reduction in the energy intensity of

enterprises, they play a role that strengthens the competitive potential, and at the same time contributes to the overall effect on a macro scale.

In a situation of underinvestment in innovative activities due to the lack of equity capital, researchers point to obtaining venture capital [105]. However, the costs associated with servicing this capital, and often the lack of access to it by micro and small enterprises, result in the abandonment of radical innovations and a focus upon the implementation of minor eco-innovations improving upon or reducing costs and enhancing the quality of products and services offered. In this respect, support for the smallest entities in financing eco-innovation through various solutions under EU programs resulting from environmental directives is of great importance. Martínez-Ferrero and Frías-Aceituno [106] found a positive link between sustainability initiatives and financial performance among companies. Good conditions created by the state give companies the opportunity to invest in eco-innovation activities, which in turn leads to positive company results that enable new resources to be invested in sustainable development activities.

The analysis indicates that enterprises experiencing an improvement in their market situation are more likely to implement most eco-innovations (Table 9). This regularity is especially true for investments in infrastructure, so requiring relatively larger financial outlays. Experiencing market successes can translate into an improvement in financial condition and at the same time encourage entrepreneurs to undertake certain in-vestments. On the other hand, in the case of companies whose market situation is deteriorating or remains unchanged, we have to deal with greater caution when it comes to implementing eco-innovations. The exceptions are, to some extent, those for which investments in infrastructure are not necessary, and the implementation is largely associated with a change in certain behaviors or habits (e.g., the use of electronic correspondence instead of paper, or limiting face-to-face meetings in favor of online contacts).

Table 9. Implementation by companies of activities consistent with environmental requirements related to the energy efficiency of the economy and changes in the market situation of enterprises.

	Decline (n = 64)	**No Changes (n = 195)**	**Increase (n = 141)**
Energy-saving machines and devices	74.2%	86.4%	96.8%
Limiting meetings and business trips in favor of online contacts	71.6%	62.8%	72.4%
Transport/delivery optimization	72.9%	95.5%	95.3%
Abandonment of paper documentation in favor of electronic	71.6%	89.6%	91.6%
Use of reusable packaging	51.1%	60.1%	59.1%
Increasing the use of secondary raw materials	33.2%	48.8%	50.2%
Implementation of energy management systems	11.5%	46.1%	52.4%
Generation of energy from renewable sources	16.6%	37.6%	51.7%
Eco-design	14.1%	26.3%	31.0%
Use of hybrid/electric cars	9.0%	17.2%	18.5%

The implementation of innovations also requires, in addition to the readiness to bear financial burdens, knowledge, often specialist knowledge, enabling the identification of market needs, current trends, and in the case of perceiving market opportunities, finding ways to use them (finding solutions, obtaining financing, etc.). The potential of the management staff, including their interest in the development of the company, plays an important role in this respect (Table 10). Overall, it is only in the event of such interest that it is possible to effectively find opportunities in the broadly understood environment to increase competitive potential, taking into account internal potentials and possibilities. This type of dependence occurs especially in the case of those implementations that require greater organizational and financial commitment. In other situations, not requiring expenditure, but only changing habits (e.g., limiting meetings and business trips in favor of online contacts), the processes in a natural way respond to the existing conditions.

Table 10. The implementation by companies of activities in accordance with environmental requirements related to the energy efficiency of the economy and the level of current attitude of the management towards market competition.

	Weak or Very Weak (*n* = 2)	**Hard to Say (*n* = 86)**	**Strong or Very Strong (*n* = 312)**
Energy-saving machines and devices	0%	64.2%	96.6%
Limiting meetings and business trips in favor of online contacts	0%	60.4%	71.0%
Transport/delivery optimization	0%	67.1%	100.0%
Resignation from paper documentation in favor of electronic	0%	65.2%	95.2%
Use of reusable packaging	0%	59.4%	58.0%
Increasing the use of secondary raw materials	0%	39.3%	49.1%
Implementation of energy management systems	0%	18.2%	50.2%
Generation of energy from renewable sources	0%	12.5%	47.8%
Eco-design	0%	16.3%	29.0%
Use of hybrid/electric cars	0%	10.5%	18.1%

Apart from the context of the conditions for the implementation of measures to increase energy efficiency on a micro scale, it should be emphasized that they may have various effects on the energy consumption of the economy on a macro scale. This impact can be considered by taking into account the time horizon (short-term and long-term impact) and the manner of impact on the energy efficiency of the economy (direct and indirect) (Table 11). Individual measures may have an impact both directly leading to the reduction of energy consumption (e.g., through the production of energy from renewable sources), but also to the rational management of waste, including secondary waste. Others, in turn, have an indirect and long-term impact, such as ecodesign, the assumptions of which are present in many processes/activities—including reducing waste, introducing eco-friendly packaging and reusable products to the market, optimizing supply chains, or offering products for generating lower energy consumption [107]. It is also worth emphasizing that the energy demand can also be treated more broadly, i.e., not only in the context of electricity consumption. Taking into account the scope of activities that can be enacted, which fit into the circular economy, we gain additional possibilities of long-term and indirect impact on the energy efficiency of the economy. Such effects can be achieved, for example, by changing business models towards product as a service (in other words, a sharing economy limiting the production of new products—less production = less energy consumption).

Moreover, individual actions taken by enterprises may be motivated in different ways. It seems that the basic and somewhat natural motivation—taking into account the fact that we are dealing with companies striving for cost optimization—is to reduce operating costs. This may further lead to an improvement in profitability or a reduction in the costs of the offered products or services, thus acquiring new customers (increasing sales) or entering new markets. Cost leadership, as one of the classic concepts of enterprise competitiveness, may still remain relevant even in a situation when new approaches based on the use of knowledge or value creation are gaining importance [108].

Table 11. The nature of the impact of solutions implemented by enterprises on the energy efficiency of the economy.

	Short-Term Impact	**Long-Term Impact**
Direct impact	Generation of energy from renewable sources Implementation of energy management systems Energy-saving machines and devices Use of hybrid/electric cars	Generation of energy from renewable sources Implementation of energy management systems Energy-saving machines and devices Use of hybrid/electric cars
Indirect impact	Limiting meetings and business trips in favor of online contacts Transport/delivery optimization	Offering energy-saving products to customers Resignation from paper documentation in favor of electronic Increasing the use of secondary raw materials Eco-design Transport/delivery optimization Limiting meetings and business trips in favor of online contacts

When considering the context of implementing solutions compliant with environmental requirements, one should also bear in mind how they affect the current operations of enterprises. Business motivation (apart from formal requirements resulting from legal regulations) is paramount for initiating any actions by economic entities. As can be seen from the responses obtained (Table 12), the main change noticed by entrepreneurs is the improvement of the image of the enterprise, although in the case of micro-enterprises, a significant change is the reduction of operating costs. In this case, as mentioned above, the effects on the part of the recipients of the offer may not be directly perceived; however, thanks to the reduction of costs, the company may enhance its profitability (almost a quarter of micro-enterprises indicated such an effect) or offer products/services at lower prices. In the case of almost one-third of small enterprises, the change in the market situation is related to the introduction of new products to the offer, while another 15% indicated the development of existing products.

Table 12. Changes in the activities/market situation of enterprises that have occurred as a result of the implemented solutions compliant with environmental requirements.

	Total (n = 400)	**Micro Enterprises (n = 300)**	**Small Enterprises (n = 100)**
Improving the company image	79.7%	82.3%	68.0%
Lowering the business costs	49.5%	52.7%	10.0%
Profitability improvement	24.4%	22.7%	2.0%
Entering new national markets in the country	17.3%	18.0%	3.0%
Sales increase	13.9%	13.7%	12.0%
Automation of customer service	13.3%	9.3%	0.0%
Introducing new products to the offer	3.5%	2.7%	32.0%
Development of existing products	3.0%	2.7%	15.0%
Entering new foreign markets	1.6%	0.7%	21.0%

According to 90% of the surveyed companies, changes in activities contributed to the creation of additional value on the part of customers. Value is understood as the surplus of the benefits perceived by the customer over the costs associated with the purchase and use of a given product or service. This was mainly related to meeting new needs, but also

reducing the costs of purchasing/using a product/service or (in the case of small enterprises) related relatively more often with increasing the usefulness of the product/service used so far or the possibility of personalizing them (Table 13). The positive impact of the implementation of eco-innovation on reducing costs and improving the profitability of enterprises is shown in the studies of a number of authors (compare [109]).

Table 13. Types of new or additional value created on the part of the recipients of the company's offer as a result of the implemented solutions compliant with environmental requirements.

	Total (n = 360)	Micro Enterprises (n = 297)	Small Enterprises (n = 63)
Satisfying new needs	79.0%	93.6%	60.3%
Lowering the costs of purchasing/using the product/service	28.7%	37.4%	6.3%
Increasing the usability of the so far used product/service	4.7%	3.4%	15.9%
Easier or faster product delivery	4.0%	5.7%	4.8%
Facilitation of contacts regarding the available offer and/or after-sales service	2.7%	2.0%	11.1%
Possibility to use a personalized product/service	2.2%	0.0%	17.5%
Easier or faster availability of the product/service	2.2%	2.4%	3.2%

It is worth paying attention to the most frequently indicated aspect, which is improving the image of companies. It is important inasmuch as it responds to the progressive trends related to the increasing consumer sensitivity to environmental issues. As a result, we are dealing with more and more conscious consumerism. For many consumers, it is also important that the offers of entrepreneurs have environmental considerations in mind. The commissioning of solutions compliant with environmental requirements should therefore be treated as an investment consisting in building a competitive advantage. Research by Aguilera-Caracuel and Ortiz-de-Mandojan [108] indicate that companies located in countries with high environmental awareness and values will strive to improve environmental performance and create awareness around their activities.

Similarly, Rezende et al. [109] found that companies located in Europe benefit more from eco-innovation than companies located in North America and Asia, both in the short and long term, for the same reasons. Thus, societies with high environmental awareness are more likely to support more eco-innovative companies. This is also in line with the meta-analysis by Bitencourt et al. [66], which found that countries with high scores in the Global Sustainable Competitiveness Index have a stronger relationship between eco-innovation and firm performance. It is also not without significance that the wide-ranging environmental policy of the EU and the countries belonging to it significantly influences such effects in comparison with other developed economies.

4. Conclusions

The presented theoretical considerations and original research results indicate the topicality and complexity of the subject matter in the area of the impact of eco-innovations implemented in micro and small companies on the improvement of their competitive position and in treating them as determinants of the energy efficiency of the economy. The conclusions of the research confirm the existence of a specific relationship between the characteristics, behaviors, and attitudes of entrepreneurs. This analysis therefore made it possible to confirm the research hypotheses. At the same time, the strongest relationship was found in relation to the size of enterprises. In this case, the key is the organizational or

financial potential necessary for this type of investment, which in turn is to some extent derived from the size of the enterprises. At the same time, it should be borne in mind that investment in eco-innovation, or more broadly, the innovative activity of enterprises, is subject to the influence of a number of other factors that can weaken or strengthen the impact of the identified independent variables. Of particular note are the support instruments available under public support programs. Their availability and the resulting financial support, often directed toward specific sectors or industries, can stimulate the involvement of enterprises in the analyzed scope.

Another determinant, as well as a limitation of the study, is the period in which it was conducted. The COVID-19 pandemic undoubtedly influenced the acceleration of the implementation of some eco-innovation solutions, but the restriction of mobility, the disruptions in supply chains, or the financial problems affecting especially smaller operators had a strong impact on the pro-innovation behavior of these companies.

The authors of the publication also note limitations of the conducted research. A limitation of the study is its general nature; the data do not allow a direct analysis of the processes leading to increased business competitiveness and energy efficiency as a result of eco-innovation. A limited number of factors influencing the implementation of eco-innovation in micro and small enterprises were also investigated, giving some scope for further research in this direction.

The context of the research results obtained reinforces entrepreneurs' belief that the decision to introduce eco-innovation is due to their independent decisions related to the business model adopted. This means that the very specificity of micro and small companies with regard to the entrepreneurial process triggers their interest in eco-innovation. This is confirmed by the cost reduction motive mentioned by entrepreneurs. In the authors' opinion, it is important that the forms of support for eco-innovation in the case of micro and small companies do not refer to the motivation of entrepreneurs, but primarily focus on the selection of appropriate sources of financing for investment in eco-innovation and on increasing their availability for those entities that, by their nature (the specificity of micro and small companies), have resource constraints both in terms of direct investment and the resources they have that can secure the loans necessary for these companies to invest in eco-innovation. The results of the survey confirm the need for a clear and stable policy to support entrepreneurs in terms of programs that enable the financing of eco-innovation implementation. It is the recognition of such opportunities created by the environment that is the basis for the wide application of eco-innovation in micro and small companies. In the authors' opinion, the above actions will further enhance the development of the economy and increase energy efficiency precisely on the basis of a conscious eco-innovation support policy in the group of micro and small companies.

The article also justifies the impact of the scale of micro and small companies on shaping the energy efficiency of the economy. The research confirmed that with regard to the scale effect, the decisions of micro and small enterprises will directly affect the energy efficiency of the economy in macro terms (reducing energy consumption as a result of rationalization of business processes). Additionally, an indirect influence is also possible in the area of creating and satisfying the needs of customers in the sociocultural and economic dimension (change of consumer behavior and habits leading to reduced energy consumption both in the short and long term).

These areas are inextricably linked with the future of energy and the already occurring consequences of the international situation, as well as the political and legal situation. The expected changes in the energy efficiency of the economy were also confirmed in the research results. They showed that in micro and small companies, eco-innovation is the result of breaking the stereotypes existing in the current business models.

Interesting in the context of the impact of eco-innovation on the improvement of the competitiveness of micro and small enterprises, as well as their impact on energy efficiency, it would be noteworthy to conduct research covering the following areas: (a) assessing the relationship between the entrepreneurial process and eco-innovation,

(b) recognizing barriers that occur in the planning and implementing eco-innovations, (c) creating detailed lists of industries and sectors in which energy efficiency is shaped on the basis of eco-innovations of micro and small companies.

In summary, it is impossible to perceive the place of micro and small entrepreneurs in the modern economy in one dimension. Their role in shaping the energy efficiency of the economy, although perceptible, should be detailed and related to the programs of shaping the energy policy of the economy. Doing so would provide the basis for assessing the impact of a significant number of entities on the areas so far seen from the perspective of only large economic entities included in the area of the energy sector. The strength of the future is the impact in a broad system combining eco-innovation with the energy efficiency of the economy based on the synergy effect.

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