energies

MDPI

Article

A Model of Innovation Activity in Small Enterprises in the Context of Selected Financial Factors: The Example of the Renewable Energy Sector

Agnieszka Kuś and Dorota Grego-Planer *

Department of Enterprise Management, Faculty of Economic Sciences and Management, Nicolaus Copernicus University in Torun, 87-100 Toruń, Poland; adk@umk.pl
* Correspondence: dgp@umk.pl

Abstract: One of the biggest problems of the modern economy is the depletion of traditional energy sources. Despite the fact that this problem was noticed several dozen years ago, steps to solve it were taken relatively recently. In December 2017, the European Union adopted a position on the directive, promoting the use of energy from renewable sources in all Member States. The EU has committed itself that by 2030, at least 27% of its energy consumption will come from renewable sources. On the one hand, it is a huge challenge, but on the other hand, it is an opportunity to achieve economic growth through innovation and a sustainable energy policy. On the Polish market, the chance to achieve the assumed plan is offered mainly by small companies that have been involved in innovative activities in the renewable energy sector in recent years. Innovation is an extraordinarily important determinant of the sustainable development of economies across the world. However, introducing it into business practice is extremely challenging for business leaders. Although there are many different factors influencing companies' engagement in innovation activity, for smaller entities, the financial aspect plays a key role. Managers of small enterprises must frequently deal with limited access to additional financial resources, the complexity of the process of determining final cost and capital structure, and its accompanying various levels of investment risk. Small companies also struggle with certain limitations on resources related to a knowledge gap in finance, tax regulations, and the forms of support potentially available at different stages of the innovation process. In light of this, it seems reasonable to establish the strict financial factors that significantly influence the innovation activity of small enterprises, especially those operating in the energy industry, due to their dynamics of development in recent years. This article aims to develop a model to explain the financial incentives for implementing innovative solutions in small businesses in the energy sector. An empirical study using the Computer-Assisted Personal Interviewmethod on a sample of 115 Polish small companies, operating in the renewable energy sector, identified critical financial factors stimulating the implementation of innovative projects. The significance of impact of key financial factors on the innovation activity of these enterprises was analysed based on a logit regression model. The results indicate that 5 of the 18 factors identified in the model were significant. These statistically significant financial determinants of the innovation activity of Polish small enterprises in the energy sector exhibited both positive and negative impacts on the level of innovation activities undertaken.

Keywords: innovation; innovation-active enterprises; sustainable development; small business; renewable energy sector

Citation: Kuś, A.; Grego-Planer, D. A Model of Innovation Activity in Small Enterprises in the Context of Selected Financial Factors: The Example of the Renewable Energy Sector. *Energies* **2021**, *14*, 2926. https://doi.org/10.3390/en14102926

Academic Editor: Sergey Zhironkin

Received: 23 April 2021
Accepted: 14 May 2021
Published: 18 May 2021

1. Introduction

The growth of economies around the globe depends on the availability of financial capital. Nevertheless, this development would also not be possible without adequate natural environmental resources and the appropriate knowledge, technology, or human

competencies to create changes. Therefore, it should be sustainable—economically, environmentally, and socially alike. However, if the concept of sustainable development is to be fully exploited in business practice, members of the organisation must recognise the need for changes to be introduced in various areas of activity [1–3]. In other words, there must be a factor that enables changes both within the individual entity and across a region or country. This factor is the broader concept of progress [4]. Progress, or more strictly, innovation, means improving and developing existing production and service technologies, introducing new organisational and management solutions, and improving and developing infrastructure—especially for gathering, processing, and sharing information. All of these aspects ultimately contribute to increasing standards of living and quality of life. The desired state of prosperity and relative balance is possible and can be achieved by appropriately managing and allocating resources gathered within five categories of capital: natural, economic, human, social, and spatial (the last involving the integration of the other four) [5].

We should emphasise here that, unfortunately, economic development and progress always have an environmental cost [6]. Therefore, actions aiming to reduce the negative effects of economic changes are required. Such actions are undertaken as part of a sustainable development policy but can also feature in a state or company's innovative strategy. Therefore, innovations fulfil not only an economic function but also a social and ecological one. In addition to maximising benefits, implementing changes in companies makes it easier for business leaders to meet ecological standards and sustainable development principles by more effectively managing their broadly understood resources. Although innovations are an important determinant of the development of a sustainable economy, they are hard to put into economic practice because they require system solutions, relevant policies, and appropriate incentives (especially financial ones—after all, financial resources are precisely what innovation activity requires). Despite the variety of forms of financing for business development, the limited amount of financing available, its high cost, and the associated investment risks present a significant problem (especially for smaller entities). To this we must also add owners' ignorance or insufficient knowledge of the possibilities for financing such activity [7] and the financial problems associated with other held resources. Help should undoubtedly be provided by a state policy that promotes innovative enterprises through an appropriate financial system of taxes, opportunities for support through public funds, and access to loans and other sources of external financing.

Modern enterprises' motivations for conducting and financing innovation activities are the subject of an extremely intense and as yet unsettled subject of discussion not only in the business world but also in the academy. This subject is especially important from the point of view of the managers of business entities, who are struggling daily with increasingly complex organisational problems. This state of affairs requires that our knowledge be expanded, especially in terms of observing markets and sectors, diversifying resources and updating information on the possibilities for support and financing for innovation activities. While the factors determining engagement in innovation activity have been and continue to be addressed by many researchers [8–14], the issue of financial factors determining increased levels of innovation among smaller entities in a specific industry (especially in one dominated by larger economic entities) also represents a specific gap in knowledge.

The small- and medium-sized enterprise (SME) sector is an inseparable and extremely important feature of many countries' economic landscapes. In Poland, the SME sector accounts for 99.8% of all companies, generates half of the gross domestic product, and employs the majority of society [15]. At this point, it is worth emphasising that among the entire SME sector, there are almost 130,000 small enterprises, which perform many social and economic functions. The SME sector is often presented in the literature as the foundation upon which competitiveness and innovation are built in modern economies [16–20]. The high innovative potential of small enterprises results from the combination of opportunities on the one hand and the need to support the efficient development of innovation on the other.

Although small enterprises are the subject of many studies, they are most often lumped together with medium-sized entities in analyses of the characteristics of the SME sector as a single whole [21–23]. The present results show, however, that these entities are closer to being micro- rather than medium-sized enterprises. The specificity of small business activities prompted the authors to make them the subject of their research. In addition, the continuous development of the energy industry in Poland has attracted attention to small companies operating in the renewable energy sector.

Renewable energy sources (RES) are becoming more and more popular both on the global market and throughout the European Union [24–26]. Global research shows that RES are primarily aimed at counteracting climate change [27]. The value of primary energy obtained from renewable sources in Poland in 2019 was 396,498 TJ [28]. According to Statistics Poland, in 2019, the energy obtained from renewable sources in Poland came mainly from solid biofuels (65.56%), wind farms (13.72%), and liquid biofuels (10.36%) [29]. It should be noted that the production of renewable energy often depends on regional small enterprises [30]. In Poland, the increase in the production of this type of energy depends mainly on small enterprises trading in devices and systems for obtaining energy [31]. Therefore, achieving economic growth through a sustainable energy policy is also possible thanks to small local companies. Despite their size, these companies are trying to innovate in solar, wind, geothermal, and biomass. These innovations are often related to the production process of energy generating devices or the way of dealing with an energy source [32]. Unfortunately, these companies, due to their size, are also exposed to various barriers related to undertaking innovative activity. As with other small businesses, the financial aspect is of great importance here.

The activity of all enterprises is based on the use of capital, human, and natural resources. While in the case of the first two, we are dealing with resources, in principle, available after meeting certain conditions, in the case of natural resources, they are undeniably limited. Governments around the world are taking steps to promote the concept of a circular economy [33–36], building integrated renewable energy systems [37], or municipal waste-to-energy [38–41]. A special role is currently played by entities belonging to the sector of renewable energy sources, which are becoming ambassadors of the idea of sustainable development on many different levels. As emphasised by Gitelman, Magaril, Kozhevnikov, and Rada [42], small-scale manufacturing technologies are becoming more popular and more technologically advanced. It is thanks to intelligent innovations that opportunities for rational management of natural resources and optimisation of processes at the level of enterprises [43–46], as well as entire cities or regions [47–49], are created.

The above considerations give rise to the main research problem, which the authors present as the question: Which financial factors influence the innovation activity of Polish small enterprises in the renewable energy sector? In response to this question, the main goal of the article is to develop a model explaining the financial incentives for implementing innovative solutions in small energy enterprises in Poland.

2. Business Innovation and Innovation Activity: Theoretical Background

In light of the growing role of human resources in the development of contemporary organisations, the aspect of perceiving innovation as the human ability to act seems extremely important. It is presented by, among others, Norwegian professor Fagerberg [50], who claims that innovations are "solutions that are new and better than those used to date by humans, and which have an impact on the social and economic conditions of life", and Polish researchers [51], according to whom "innovation is always the result of human activities that translate into improvements in the quality of life of society and any activity undertaken by a person that makes actions better, more efficient and more effective".

However, academic studies are increasingly presenting multidisciplinary approaches to the essence of innovation. One is proposed by Baregheh, Rowley, and Sambrook [52] who, after a thorough analysis of several dozen different approaches to innovation in seven fields of knowledge (i.e., business and management, economics, organisational studies,

entrepreneurship, technology and engineering, knowledge management, and marketing) created a comprehensive definition reflecting the nature of contemporary innovations. They stated that "innovation is a multi-stage process in which organisations transform ideas into new or improved products, services or processes, in such a way as to systematically develop, compete and effectively stand out on the market".

However, the business innovativeness is perceived to be slightly different from innovations themselves, and nowadays, alongside knowledge and information, it forms a particular triad of companies' growth and development. Therefore, business entities' ability to create and absorb innovative solutions in their activities and to conduct research and development (R&D) is of particular importance at the organisational level in the era of heavy market competition. Existing market realities, combined with the expanding consequences of globalisation, are obliging entrepreneurs to reconsider the organisation management system and their prospects for further expansion. The current market economy system operates mainly based on heterogeneous entities performing different functions in it and facing various challenges arising from the dynamics of changes in the business environment. Nevertheless, it is primarily enterprises that are responsible for systematically generating and adapting innovative solutions that translate into improved societal quality of life and increased indices of innovation across the entire economy. At this point, it is worth emphasising that organisation-level innovations are presented in two basic categories:

- Innovations as the outcome (i.e., the volume of solutions introduced in an organisation), which the literature equates more with a firm being "innovative";
- Innovations as the process (i.e., a succession of events designed to ultimately lead to new or significantly improved solutions being implemented in an organisation), which the literature equates more with a firm being "innovation-active".

Damanpour and Wischnevsky [53] equate an innovative organisation with an entity that simultaneously generates new innovative solutions internally and transfers them from external sources. In studying the innovation activity of enterprises, it is recommended, however, to refer to the terminology adopted in the Oslo Manual. According to the latest, the fourth edition, "the innovation status of a firm is defined on the basis of its engagement in innovation activities and its introduction of one or more innovations over the observation period of a data collection exercise" [54].

For the present article it is taken that [55]:

- An innovative firm reports one or more innovations within the observation period. This applies equally to a firm that is individually or jointly responsible for an innovation;
- A non-innovative firm reports no innovations within the observation period;
- An innovation-active firm is engaged at some time during the observation period in one or more activities to develop or implement new or improved products or business processes for an intended use.

It is worth highlighting that innovative and non-innovative firms alike can be innovation-active during an observation period [55].

The benefits of firms undertaking innovation activity are invaluable. Firstly, they positively affect not only the financial results of the company itself but also production processes, productivity, efficiency, productivity, work quality, and organisation [56–58]. Secondly, they also affect development and competitiveness in the national and global economy [59–61].

What is key is that enterprises be aware of these positive effects of innovation activity, because as Anthony, Johnson, Sinfield, and Altman [62] write, it is often difficult for owners to estimate them properly. However, once they notice them and are willing to undertake innovation activity, it is extremely important that compatible actions be taken at all possible levels to support this activity—from an appropriate pro-innovation policy and dedicated support options offered by supra-national, national, and regional institutions to the firms' own systematic activity to obtain additional funds to finance innovations.

3. The Innovation Support System

The growth and development of modern economies is largely determined by constant scientific advances, the development of new technologies, and the creation and appropriate management of unique resources. This state of affairs is clearly visible in technologically advanced countries, which base their economic advantage on a strong R&D base, the allocation of ample financial resources to create innovative solutions, and, thus, a significant and constantly growing number of patent applications In 2019, Poland was in 15th place in the world in terms of the number of patents granted on the list of the World Intellectual Property Organization. According to WIPO, in 2019, 4361 patents were filed, and the number of valid European patents in Poland amounted to nearly 92,000 [63]. In turn, according to the Polish Patent Office, in 2019, it granted 3042 patents for inventions—including those relating to renewable energy sources from biomass, wind, water, solar, geothermal energy, and heat pumps [64,65]. However, it should be emphasised that technological progress is not an automatic process—it requires, above all, that a well-organised innovation policy system exists. Legal regulations encouraging investment, such as various tax breaks or appropriate interest rates; appropriate support infrastructure; and instruments for financing innovation tailored to the needs of smaller companies in particular all make it possible to increase entrepreneurship and the economic credibility of the state. In addition, an efficient innovation system is needed to combat the barriers SMEs face when implementing innovations, i.e., limited financial resources and the greater problems in accessing external financing sources, as confirmed by the research of, for example, [66–68]. Therefore, extraordinary significance is accorded to the activity of state and local authorities [69] and to the choice of the right direction and goals for the EU pro-innovation policy, which consists in, for example, offering attractive and preferential forms of financial outlays on innovation activities for enterprises needing support.

The pace of individual countries' development shows each of them to have progressed to different degrees in innovation, and this brings with it a regional specificity in the innovation system. On the other hand, in the face of the expanding consequences of the internationalisation of economies, the domestic innovation system is spatially complex. The innovation system is treated primarily as an auxiliary instrument for implementing the principles of innovation policy programmes.

The effective operation of an innovative system mechanism requires extensive co-operation and the exchange of knowledge and information between industrial, scientific, and public sector entities, which should operate within a friendly pro-innovative climate that favours the creation, implementation, and commercialisation of innovative solutions. These features of the innovation system mechanism relate indirectly to the "triple helix model" by [70] from the early 21st century literature, which consists in active cooperation and interaction between the three main actors in the economy—the scientific community, the business community, and public administration—in order to generate and exchange new layers of knowledge, as well as innovative products or services. There are dynamic changes taking place in how the innovative process is implemented. These consist mainly in increasing numbers of entities and institutions being involved in creating innovative solutions. In the face of these changes, there is a growing importance of concepts being developed based on the triple helix model. These are the quadruple helix model [71], which includes society as the fourth actor in the innovation system, and the quintuple helix model [72], which additionally includes the environment as an essential part of a sustainable innovation process.

It is no easy task to determine the best direction for implementing an innovation policy, despite the relatively broad support opportunities that exist for business entities. It is necessary not only to set a path for the economy to develop that is both in line with EU policy and at the same time compatible with a country's macro-economic potential but, above all, to promote comprehensive solutions for R&D activities or the transfer of new technologies. Sectoral tools for supporting innovative processes at every stage of companies' development are also important in this regard. Proper coordination of the

innovation system to enable the long-term, sustainable development of enterprises, and those enterprises' conduct of wide-ranging innovation activities, should be prioritised in consistent central and local authority activities.

4. Internal Financial Factors in Innovation Activity

Undertaking innovation activity, especially in the case of smaller entities, entails numerous financial problems on the part of—and thus within—the company itself. Firstly, there is often a lack of funds for such activity, while innovation activities entail a high financial risk and often very expensive technological infrastructure, for example, in the energy sector [73–75]. Secondly, enterprises have to go through selecting appropriate sources of financing for innovation activities, which often poses a huge challenge for company management. It is hard to argue with [76] when she asserts that this state of affairs stems very much from the fact that "the stability of a company's economic existence is made possible only by having or procuring sufficient financial resources at a given stage of the company's development".

Financing opportunities for innovation offered by both domestic entities and foreign institutions force entrepreneurs to systematically search for information and to build optimal financial strategies.

The selection of financing sources itself depends, however, on factors such as availability and the cost of applying for funds. In addition, the owner's preferred level of company independence and risk aversion, the structure of assets, and the company's level of profitability should all also be taken into account [77]. Additionally, in the SME sector in particular, the selection of appropriate sources of financing innovation should be analysed from the perspective of the four basic phases of enterprise development. One of the most frequently cited models of an organisation's life cycle is that of Quinn and Cameron [78]. In the private sector, one of the first models was the three-dimensional model of Lippitt and Schmidt [79]. Today, however, an enterprise's lifespan is assumed to go through four phases. They are establishment, growth, maturity, and decline [80].

In the creation and initial development phase, the main source of financing is equity. High operational risk and negative net cash flow deter lenders from financing businesses. In the growth phase, companies have a huge demand for external capital. Original and very innovative projects have a chance to obtain support from high-risk funds, such as private equity or venture capital, or from private investors ("business angels"). At almost every stage of the development of an economic entity, an entrepreneur may take advantage of a variety of support programmes and the public funds they provide. Therefore, support from domestic institutions offering assistance in financing development activities is important, as is the relevant government policy. In successive phases of an organisation's life cycle, the opportunities for financing innovation activities is extended to include services provided by commercial banks, capital market instruments, or funds from various economic agreements (e.g., leasing or factoring).

The choice of a specific source of financing for innovation activities also depends on the cost of capital used in the investment process, especially among small entities. At this point, it should be emphasised that "the methodology for calculating the cost of equity depends on whether the equity derives from external sources (e.g., an issuance of shares) or internal sources (e.g., retained earnings)" [81]. In economic practice, when expanding current activity or approaching completely new projects, the sources of financing used to date are usually diversified or changed, bearing in mind the applicable tax system and sectoral specifics.

In addition to the aforementioned examples of financial incentives determining the decision-making process in the selection of funds to cover the costs of innovation projects, the last and individual factor is the owner's preferences as to the acceptable level of independence in the company. The decision-making conditions in the search for sources of financing innovation activities may be hampered, on the one hand, by a lack of knowledge about the forms of fundraising and, on the other, by the attitudes of the owners of businesses

(especially smaller ones) resulting in a reluctance to finance the company's development with outside capital.

This context surrounding decisions and the theoretical explanation of the determinants of capital structure relate directly to the pecking order theory (POT). Donaldson [82] (1961) and, later, Myers and Majluf [83], noted that capital structures reflect the relationship between internally available funds and investment requirements (including innovation requirements). POT suggests that companies have a hierarchy of preferences for sources of financing. This results from the asymmetry of information between the management and potential providers of capital [84]. According to the theory, first and foremost, entrepreneurs are motivated by the desire to maintain ownership and thus implement investment projects based on internal sources (usually in the form of self-financing). Then, once those are exhausted, various forms of external financing (mainly credit based) are used, and only then do entrepreneurs decide to increase the share capital by increasing the number of shareholders.

Additionally, it should be mentioned here that the business leader's choices may also relate to trade-off theory. This theory was developed by Modigliani and Miller [85,86] and first presented by Kraus and Litzenberger [87], and then modified, by, among others, Jensen and Meckling [88], Myers [89,90], and Haugen and Senbet [91]. The static trade-off theory of capital structure assumes that in a period of analysis, a company's optimal capital structure is obtained by balancing tax benefits against the costs of financial difficulties (e.g., direct and indirect costs of bankruptcy) together with the agency costs of equity and outside capital. In trade-off theory, the optimal balance between outside capital and equity is determined, but it does not matter what the sources of equity are—whether internal or external. Changes in the financial situation in the business and in its environment also change the costs and benefits related to company debt. There is therefore no single, optimal capital structure that can remain constant [92]. As rightly pointed out by [93], the static model of trade-off theory needed to be dynamised. According to dynamic trade-off theory, an important determinant of a company's decision to raise capital is the pursuit of a so-called target capital structure, which is frequently adapted to changes in operating conditions.

These two competing approaches can be used to analyse changes in the capital structure of enterprises and, thus, in the structure of innovation financing. Theories of capital structure are constantly being modified [94] to account for an ever wider set of factors affecting the company's choices of financing sources.

It should be noted, however, that undertaking innovation activity may also be detrimental to other financial factors within a company. In addition to the aforementioned owner choices of sources and opportunities for financing innovation, we should also mention other factors here, such as the company's financial potential, the knowledge and experience of the accounting and financial staff, or the degree of computerisation of financial and accounting activities.

Summing up, the financial aspect of companies' decisions to engage in innovation activity is dictated by multiple heterogeneous factors, both endogenous and exogenous.

5. Materials and Methods

In order to identify which financial factors influence the innovation activity of Polish small enterprises operating in the energy industry, quantitative analyses were performed. They were based on direct CAPI interviews with owners or managers of these enterprises. The interviews were conducted in 2019 in companies dealing with energy production and distribution.

Finally, 115 purposefully selected enterprises included in the analysed industry participated in the study. In view of the possibility of conducting various activities in the renewable energy sector, the structure of the sample covered by the study is presented here. Table 1 shows the division of the studied sample according to the predominant form of activity with the use of the section of the Polish Classification of Activities. The

sample is definitely dominated by small generating companies and entities involved in the production, construction, and assembly of electrical installations based on the use of renewable energy sources—especially solar energy. In the study, in addition to the traditional methods of logical inference, the work used statistical tools in STATA software to create a logit model.

Table 1. The structure of the surveyed enterprises in the renewable energy sector.

The Dominant Section of Activity According to PKD	Participation %
35.11—electricity generation	60.87%
43.21—making electrical installations	26.08%
42.99—construction of other civil engineering structures (not elsewhere classified)	6.96%
35.14—electricity trade	4.35%
38.21—treatment and disposal of non-hazardous waste	1.74%

Source: own research.

The attempt to examine the influence of independent variables on the dichotomous dependent variable employed the logit regression method, based upon which the following logit model was built [95]:

$$\text{logit (pi)} = Zi = \beta = \beta 0 + \beta 1X1i + \beta 2X2i + \ldots + \beta kXki \quad (1)$$

The subject of estimation in the logit model are the parameters β0, β1, β2, . . . , βk, which are elements of the β vector. These parameters are usually estimated using the maximum likelihood method (MLM) [96,97]. MLM estimators have an asymptotic normal distribution. Therefore, the significance test for a single parameter is based on the z-statistic with the distribution N (0,1). As a rule, the table of estimation results shows the values of the z-statistic, as well as the empirical significance level ($p > |z|$) at which the hypothesis of the insignificance of a given parameter should be rejected. The identity of the entire log model is verified by the likelihood ratio test.

In an attempt to answer the question of which financial factors significantly affect the innovation activity of small energy enterprises, a list of potential financial variables was first prepared that might imply the companies' level of innovation. Based on numerous studies [12,98–104], subjectively the 5 most important financial internal factors potentially influencing the innovative activity of small business entities were distinguished. Internal factors conditioning the innovation activity were assessed on an ordinal scale (0–3) (where: 0—no resource, 1—low impact, 2—moderate impact, 3—high impact). On the other hand, among the main groups of external conditions shaping the innovative activity of an enterprise in the financial context, the following factors should be mentioned [8,105–113]: economic, political and legal, international, technological, and sectoral. Meanwhile, external factors implying the innovation activity of small enterprises were assessed by the respondents on an ordinal scale (1–5) (where: 1—very bad; 2—bad; 3—neither good nor bad (neutral); 4—good; 5—very good). In developing the logit model, all 18 financial factors, hereinafter called explanatory variables X_1–X_{18}, were adopted. Most of them (72%) were from the organisation's environment, and the remaining 28% were internal. Innovation activity, understood as the implementation of at least one innovation in the study period, was selected as the main explained variable (Y_1). The characteristics of the variables used in the model are presented below in Table 2.

Table 2. Characteristics of variables used in the financial model.

Variables	Designation
Explanatory variables internal to the organisation (ordinal scale 0: 3)	
X_1	Size of company R&D budget
X_2	Company's financial potential
X_3	Access to external financing sources
X_4	Degree of computerisation of financial and accounting activities
X_5	Knowledge, experience, and skills of financial and accounting staff
Explanatory variables from the external environment (ordinal scale 1: 5)	
X_6	Slowdown in economic growth in Poland
X_7	Inflation rate
X_8	Interest rates
X_9	Stability of exchange rate
X_{10}	European Funds
X_{11}	Amount of tax credits
X_{12}	Financial support for SME development
X_{13}	Institutional support for SME development
X_{14}	National innovation policy
X_{15}	Government Research and Development Policy
X_{16}	Sectoral support for SMEs
X_{17}	Availability of bank loans
X_{18}	Availability of other sources of financing for innovation (venture capital, business angels)
Explained variable (dichotomous scale 0: 1)	
Y_1	Innovation activity of the enterprise

Source: own research.

6. Results

In order to investigate the significant financial determinants of innovation activity in surveyed enterprises, a logit regression model was applied. To create the model that best reflects the phenomenon, it was decided to eliminate a few more variables with the highest p values. Four variables (X_{17}, X_1, X_{14}, X_3) were thus deleted to provide the final form of the model (Table 3).

Next, a likelihood test was conducted on the final model (LR chi2 (14) = 49.3540; Prob > chi2 0.000), which indicates the significance of the model, and is thus a reliable basis for further interpretation of the results. The McFadden pseudo-R^2 coefficient was selected as a measure of the quality of model fit to the data. In this case it is 0.2422, indicating the relative degree of explanatory power of the dependent variable.

In the above model, the estimated parameters take not only positive but also negative values, meaning that the independent variables' impact on the dependent variable translates into an increase or decrease, respectively, in the chances of small energy enterprises introducing innovations.

Table 3. Financial logit model for innovation activity.

Var.	Coeff.	Std. Err.	z	p > |z|	95% Conf. Interval	
Constant	−0.2648	1.2849	−0.2060	0.8368	−2.7830	2.2535
X_2	0.5740	0.2790	2.057	0.0397 **	0.0271	1.1210
X_4	0.2843	0.3955	0.7188	0.4723	−0.4909	1.0596
X_5	0.4219	0.3645	1.157	0.2471	−0.2926	1.1364
X_6	0.5105	0.3097	1.648	0.0993 *	−0.0965	1.1175
X_7	−0.6099	0.4239	−1.439	0.1503	−1.441	0.2211
X_8	−0.3883	0.4066	−0.9549	0.3396	−1.1853	0.4087
X_9	0.2134	0.3352	0.6366	0.5244	−0.4436	0.8704
X_{10}	−0.1165	0.3140	−0.3710	0.7106	−0.7317	0.4988
X_{11}	−0.9967	0.4010	−2.4860	0.0129 **	−1.7825	−0.2109
X_{12}	0.7030	0.3667	1.917	0.0552 *	−0.0157	1.4217
X_{13}	−0.1841	0.3679	−0.5005	0.6167	−0.9052	0.5370
X_{15}	0.1579	0.3280	0.4813	0.6303	−0.4851	0.8008
X_{16}	0.6031	0.2652	2.274	0.0230 **	0.0833	1.1229
X_{18}	0.1727	0.3901	0.4428	0.6579	−0.5918	0.9373
N	115					
LRchi2(14)	49.3540					
Prob > chi2	0.000					
Pseudo R^2	0.2422					

Source: own research. * significant at the level of 0.1; ** significant at the level of 0.05.

In the analysed financial model, the following variables proved themselves to be statistically significant: X_2—Company's financial potential, X_6—Slowdown in economic growth in Poland, X_{11}—Amount of tax credits, X_{12}—Financial support for SME development, and X_{16}—Sectoral support for SMEs.

Of the 115 enterprises, 96 were correctly diagnosed as belonging to the group that introduced innovations. This means that the logit function predicts the event to an accuracy of 84.2%, meaning it was erroneous in 19 cases. In this model, the odds ratio is 13,00, meaning that the model forecasts at better than random.

The estimated model was interpreted using the odds ratio for the ith variable, assuming invariability of the remaining model variables (Table 4).

Table 4. Evaluation results for the logit model of innovation activity: odds ratios.

Var.	Odds Ratio	Std. Err.	z	p > |z|	95% Conf. Interval	
Constant	0.7674	0.9860089	−0.21	0.837	0.0619	9.5214
X_2	1.7754	0.4953884	2.06	0.040**	1.0275	3.0677
X_4	1.3288	0.525602	0.72	0.472	0.6121	2.8850
X_5	1.5249	0.555876	1.16	0.247	0.7464	3.1155
X_6	1.6661	0.51596	1.65	0.099 *	0.9080	3.0570
X_7	0.5434	0.2303759	−1.44	0.150	0.2368	1.2474
X_8	0.6782	0.2757844	−0.95	0.340	0.3057	1.5049
X_9	1.2379	0.4149581	0.64	0.524	0.6417	2.3879
X_{10}	0.8901	0.279405	−0.37	0.711	0.4811	1.6467
X_{11}	0.3691	0.1479871	−2.49	0.013 **	0.1682	0.8099
X_{12}	2.0198	0.7405967	1.92	0.055*	0.9844	4.1440
X_{13}	0.8318	0.3060288	−0.50	0.617	0.4044	1.7108
X_{15}	1.1710	0.3841107	0.48	0.630	0.6157	2.2272
X_{16}	1.8278	0.484697	2.27	0.023 **	1.0869	3.0736
X_{18}	1.1886	0.463425	0.44	0.658	0.5533	2.5531

* Significant at the 0.1 level; ** significant at the 0.05 level. Source: own research.

Based on the data presented above, it can be stated that:

- The greater the financial potential of the enterprise, the higher the chance of them introducing innovation—by an average of 1.78 times;
- A greater economic slowdown in Poland increases the chance of a small energy enterprise introducing innovation by an average of 1.67 times;
- The greater the amount of tax allowances, the lower the chance of small energy enterprises introducing innovations—by an average of 63%;
- Greater financial support for SMEs increases the chance of small energy enterprises introducing innovations by an average of 2.02 times;
- Greater sectoral support for SMEs increases the chance of small energy enterprises introducing innovations by an average of 1.83 times.

7. Discussion

Obtained results exhibit certain patterns. Firstly, the importance of financial and sectoral support in the innovativeness of small enterprises stands out clearly—the higher the rating of various support areas, the higher the probability of such companies implementing innovations. Smaller economic entities, because of the specifics of how they operate, often need help developing their business, ranging from organisational and advisory issues, through proper training, to obtaining additional sources of innovation financing. That is why it is important that not only individual mechanisms should function well, but so too should the entire system that supports the expansion of smaller enterprises through modern organisational solutions and by offering innovative products and services tailored to consumer needs. Similar conclusions were put forward by Henrekson and Johansson [111], who emphasise that it is extremely important to understand the dynamics of innovation in small enterprises. It is for this group of enterprises that the government's innovation support programmes should be adapted. Despite the wide range of training options and financing programmes available on the domestic and international market (an example of support in this area is a programme initiated by the European Bank for Reconstruction and Development (Polish Sustainable Energy Financing Facility I and II) [112] or a project dedicated to the SME sector financed by the European Commission (efficiency of energy use in small- and medium-sized enterprises) [113]), Polish small energy enterprises use them quite sparingly. Perhaps this is because the specific forms of support do not match the current needs of business leaders or because of the excessive bureaucracy and formalities involved in applying for financial aid. On the other hand, this state of affairs may also be the result of a lack of information on specific opportunities to obtain aid in the specific sector, or even entrepreneurs' straight-out reluctance to use outside sources to finance their activities. Harel and Kaufman [114] drew attention to the market failure in the field of financing innovations for small enterprises. This market failure includes structural factors that result from the combination of the unique characteristics of these companies and existing funding sources that do not provide compatible solutions with these companies. According to Berenguer de Vasconcelos and Gois de Oliveira [115], large enterprises have a greater chance of developing innovations because they have easier access to their financing. In addition, the failure in obtaining financing for innovations by small companies may sometimes result from the owner's lack of knowledge and experience in doing "business" with financial institutions [116]. Nevertheless, in many cases, the received support led to the decision to implement a subsequent innovation project, or to complete a project that had been underway for a long time, and whose resultant product or service ultimately found a practical application in the economy.

Secondly, the only statistically significant internal financial factor to increase the chances of innovations being implemented in a small energy enterprise was the company's financial potential. Modern-day firms, if they want to develop effectively in a turbulent environment, are in a way obliged to develop—within their organisation—certain features and methods of operation appropriate to the emerging directions and pace of social and industry changes. Moreover, smaller businesses must develop their potential, including

financial potential, such as to constantly expand their mechanisms for solving emerging challenges and improving their position on the market or relative to competitors. As early as 1989, Kleinknecht, who conducted research among small enterprises in the Netherlands, drew attention to this. He recognised that the financial potential of these companies is extremely important because it is the limited financial resources that are the greatest barriers to the implementation of innovations [117]. Our results are also in line with more recent work carried out in various industries. As proved by Piwowar-Sulej et al. [118], the financial potential of small enterprises in the confectionery industry is also necessary to be innovative. The proper financial management of a company—and especially in small companies, where the owner is often also an accountant—requires not only specialist knowledge but, above all, the ability to see the entity's financial capabilities from a broader perspective. The main barriers to the implementation of innovations are the high costs of innovative activity, fear of changes, and the lack of information about external sources of aid. The above-mentioned factors mainly affect small businesses due to their limited financial resources [119]. Moreover, in building the company's financial potential, the implementation of a new energy project may at some point involve the need for risk taking in terms of changing the structure of how the company's development is financed. Ultimately, the use of external sources for financing innovation should be determined by several factors, including the cost of capital, the return on investment, and the acceptable level of potential risk that the planned project involves.

Thirdly, there were extremely interesting results concerning the significant impact that two external factors—economic slowdown in Poland and the size of tax reliefs—had on the innovation activity of small energy enterprises. As much as the first increases the likelihood of innovation in a small enterprise, the second has an equally negative impact on the implementation of new solutions in the surveyed companies. In the case of the first factor, the explanation for the results should be sought primarily in the relatively low impact of the effects that the economic crisis had on the functioning of Polish business entities, as confirmed by numerous studies. A period of economic stagnation may present an opportunity for entrepreneurs to introduce organisational or production changes. It may be worthwhile analysing in detail the effectiveness of particular safety mechanisms in the company and identifying those features that contributed to easing or aggravating the firm's passage through the crisis. Some specific features of small companies, such as their high operational flexibility, enable them to reorganise their work more quickly and to adapt to new market conditions. Tzadik is of a similar opinion [120] and Ronen Harel, Dafna Schwartza, and Dan Kaufmann also [121]. The energy industry, which has recently experienced tremendous development in Poland, is a good example. Therefore, it should not be ruled out that the economic slowdown may have stimulated the generation of new ideas in small enterprises in Poland. In assessing the impact of the second factor, i.e., the scale of tax allowances, on innovation in surveyed companies, the situation is somewhat different. For small- and medium-sized enterprises, the right choice of form of taxation and the list of tax-deductible items will be more important to their functioning and development. The system of applicable legal regulations in Poland, including those relating to tax reliefs, is regularly updated, and, thus, from year to year, it enables various measurable tax benefits to be gained. However, just recently, an R&D relief and another called Innovation Box that are reflected in the final tax bill have been available to entrepreneurs. However, it is not widely used yet. It should therefore be assumed that during the study period, the factor relating to the size of the tax reliefs did not play a major role in the development of organisational innovation.

8. Conclusions

At the end of 2020, Poland faced a huge challenge from the European Union—to achieve a 15% share in the consumption of renewable energy. However, this goal has not yet been achieved. Investments made by micro producers and small renewable energy enterprises are a real salvation from the high fines imposed by the Union. It is them that in

recent years have ensured the growth of renewable capacities resulting from the development of photovoltaic systems, for example, [31]. Although research shows that Poland is still one of the countries with the lowest share of renewable energy consumption [122,123], the innovativeness of small companies in this sector creates opportunities to improve these results. However, it is not easy for companies of this size to cope with numerous limitations, especially on the part of finances.

The main aim of the article was to develop a model explaining the financial incentives for implementing innovative solutions in Polish small businesses in the renewable energy industry. The search for the critical financial factors that translate into these firms' innovation activity has seen interesting results. Individual determinants, both exogenous and endogenous, were statistically significant.

In the case of strictly financial factors and their impact on the innovation activity of Polish small energy enterprises, aspects related to broader support for the sector (and especially to financial support) and issues related to the financial potential of the organisation were statistically significant. These financial factors' correlations with increased probability of innovative solutions being implemented in Polish small energy enterprises are justified. However, considerably controversial results were obtained in terms of the impact of the amount of tax allowances and the slowdown in the country's economic development. The proposed financial model of innovation activity in small enterprises has prospects for observing the impact of individual financial variables on the number of implemented innovative solutions.

The presented model includes a relatively comprehensive, though still open, list of financial factors that may turn out to be key to assessing the level of adaptation of new solutions in small energy enterprises. There is no doubt that the development of innovation in enterprises, and its accompanying determinants in an industry context, including those that take into account sustainable approaches to organisational development, constitute a particularly important issue among small companies, upon which the growth of economies is founded. The authors are aware that the presented reflections have certain limitations, and that the conclusions relate to a narrow aspect of the innovativeness of modern business entities in the dynamically developing energy industry.

However, the conducted research procedure may be a starting point for conducting similar analyses in other sectors of the economy, in which small companies also play an important role.

Author Contributions: Conceptualisation, A.K. (50%) and D.G.-P. (50%); Methodology, A.K. (50%) and D.G.-P. (50%); Investigation, A.K. (50%) and D.G.-P. (50%); Resources, A.K. (50%) and D.G.-P. (50%); Writing—original draft preparation, A.K., (50%), and D.G.-P. (50%); Supervision, funding acquisition, A.K. (50%) and D.G.-P. (50%). All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Acknowledgments: The authors thank the companies' representatives participating in the research.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Borowski, P. Digitization, Digital Twins, Blockchain, and Industry 4.0 as Elements of Management Process in Enterprises in the Energy Sector. *Energies* **2021**, *14*, 1885. [CrossRef]
2. Hąbek, P.; Lechowicz, P. Assessment of sustainable production practices. The case of company from metal industry. *Multidiscip. Asp. Prod. Eng.* **2019**, *2*, 447–456. [CrossRef]
3. Sitek, M.; Tvaronavičienė, M. Innovation Management in Polish Real Estate Developers in the Renewable Energy Sources Context. *Energies* **2021**, *14*, 1702. [CrossRef]

4. Kożuch, M. Innowacje jako narzędzia rozwoju zrównoważonego. *Nierówności Społeczne A Wzrost Gospod.* **2017**, *50*, 64–73. [CrossRef]
5. Trzepacz, P. Geneza i Istota Koncepcji Rozwoju Zrównoważonego. In *Zrównoważony Rozwój–Wyzwania Globalne*; Trzepacz, P., Ed.; Instytut Geografii i Gospodarki Przestrzennej Uniwersytetu Jagiellońskiego: Kraków, Poland, 2012.
6. Mulder, K.F. Innovation for sustainable development: From environmental design to transition management. *Sustain. Sci.* **2007**, *2*, 253–263. [CrossRef]
7. Prystrom, J.; Wierzbicka, K. *Finansowanie Działalności Innowacyjnej*; Difin: Warszawa, Poland, 2015.
8. Assink, M. Inhibitors of disruptive innovation capability: A conceptual model. *Eur. J. Innov. Manag.* **2006**, *9*, 215–233. [CrossRef]
9. Trott, P. *Innovation Management and New Product Development*; Financial Times Prentice Hall: Hoboken, NJ, USA, 2011.
10. Del Río, P.; Peñasco, C.; Romero-Jordán, D. Distinctive Features of Environmental Innovators: An Econometric Analysis. *Bus. Strat. Environ.* **2015**, *24*, 361–385. [CrossRef]
11. Cheng, C.; Yang, M. Enhancing performance of cross-border mergers and acquisitions in developed markets: The role of business ties and technological innovation capability. *J. Bus. Res.* **2017**, *81*, 107–117. [CrossRef]
12. Martínez-Román, J.A.; Romero, I. Determinants of innovativeness in SMEs: Disentangling core innovation and technology adoption capabilities. *Rev. Manag. Sci.* **2017**, *11*, 543–569. [CrossRef]
13. Fernández-Serrano, J.; Martínez-Román, J.A.; Romero, I. The entrepreneur in the regional innovation system. A comparative study for high- and low-income regions. *Entrep. Reg. Dev.* **2018**, *31*, 337–356. [CrossRef]
14. Grego-Planer, D.; Kus, A. Determinants of Innovation Activities in Small Enterprises: A Model Approach. *Eur. Res. Stud. J.* **2020**, *XXIII*, 137–148. [CrossRef]
15. Zakrzewski, R. *Skowrońska. Raport o Stanie Sektora Małych i Średnich Przedsiębiorstw w Polsce*; Polska Agencja Rozwoju Przedsiębiorczości: Warszawa, Poland, 2019.
16. Karadag, H. The Role of SMEs and Entrepreneurship on Economic Growth in Emerging Economies within the Post-Crisis Era: An Analysis from Turkey. *J. Small Bus. Entrep. Dev.* **2016**, *4*. [CrossRef]
17. Herr, H.; Nettekoven, Z.M. *The Role of Small and Medium-Sized Enterprises in Development What Can Be Learned from the German Experience?* Global Labour University: Berlin, Germany, 2017; Working Paper No. 53.
18. Ruchkina, G.; Melnichuk, M.; Frumina, S.; Mentel, G. Small and medium enterprises in the context of regional development and innovations. *J. Int. Stud.* **2017**, *10*, 259–271. [CrossRef]
19. De Martino, M.; Magnotti, F. The innovation capacity of small food firms in Italy. *Eur. J. Innov. Manag.* **2018**, *21*, 362–383. [CrossRef]
20. Erdin, C.; Ozkaya, G. Contribution of small and medium enterprises to economic development and quality of life in Turkey. *Heliyon* **2020**, *6*, e03215. [CrossRef]
21. Grego-Planer, D.; Glabiszewski, W. Wpływ Egzogenicznych Uwarunkowań Na Proces Kreowania Innowacji w Wybranych Małych i Średnich Przedsiębiorstwach. *Pr. Nauk. Uniw. Ekon. Wrocławiu* **2016**, *444*, 157–165. [CrossRef]
22. European Union. *Annual Report on European SMEs 2017/2018*; SMEs Growing Beyond Borders; EU Publications: Luxembourg, 2018.
23. Hvolkova, L.; Klement, L.; Klementova, V.; Kovalova, M. Barriers Hindering Innovations in Small and Medium-Sized Enterprises. *J. Compet.* **2019**, *11*, 51–67. [CrossRef]
24. Svazas, M.; Navickas, V.; Krajnakova, E.; Nakonieczny, J. Sustainable supply chain of the biomass cluster as a factor for preservation and enhancement of forests. *J. Int. Stud.* **2019**, *12*, 309–321. [CrossRef]
25. Kluts, I.; Wicke, B.; Leemans, R.; Faaij, A. Sustainability constraints in determining European bioenergy potential: A review of existing studies and steps forward. *Renew. Sustain. Energy Rev.* **2017**, *69*, 719–734. [CrossRef]
26. Ozturk, M.; Saba, N.; Altay, V.; Iqbal, R.; Hakeem, K.R.; Jawaid, M.; Ibrahim, F.H. Biomass and bioenergy: An overview of the development potential in Turkey and Malaysia. *Renew. Sustain. Energy Rev.* **2017**, *79*, 1285–1302. [CrossRef]
27. Caruso, G.; Colantonio, E.; Gattone, S.A. Relationships between Renewable Energy Consumption, Social Factors, and Health: A Panel Vector Auto Regression Analysis of a Cluster of 12 EU Countries. *Sustainability* **2020**, *12*, 2915. [CrossRef]
28. Grębosz-Krawczyk, M.; Zakrzewska-Bielawska, A.; Glinka, B.; Glińska-Neweś, A. Why Do Consumers Choose Photovoltaic Panels? Identification of the Factors Influencing Consumers' Choice Behavior regarding Photovoltaic Panel Installations. *Energies* **2021**, *14*, 2674. [CrossRef]
29. Statistics Poland. *Energy from Renewable Sources in 2019*; Statistics Poland: Warsaw, Poland, 2020.
30. Gródek-Szostak, Z.; Suder, M.; Kusa, R.; Szeląg-Sikora, A.; Duda, J.; Niemiec, M. Renewable Energy Promotion Instruments Used by Innovation Brokers in a Technology Transfer Network. Case Study of the Enterprise Europe Network. *Energies* **2020**, *13*, 5752. [CrossRef]
31. Zimon, G.; Sobolewski, M.; Lew, G. An Influence of Group Purchasing Organizations on Financial Security of SMEs Operating in the Renewable Energy Sector—Case for Poland. *Energies* **2020**, *13*, 2926. [CrossRef]
32. Hamerla, E. Innowacje a odnawialne źródła energii. Porównanie siłowni wiatrowych o pionowej i poziomej osi obrotu. *Gospod. W Prakt. I Teor.* **2018**, *50*, 21–34. [CrossRef]
33. Giezen, M. Shifting Infrastructure Landscapes in a Circular Economy: An Institutional Work Analysis of the Water and Energy Sector. *Sustainability* **2018**, *10*, 3487. [CrossRef]
34. Geissdoerfer, M.; Savaget, P.; Bocken, N.M.P.; Hultink, E.J. The Circular Economy—A new sustainability paradigm? *J. Clean. Prod.* **2017**, *143*, 757–768. [CrossRef]

35. European Parliament. *Circular Economy with Focus on Waste, Renewable Energy and Sustainable Bioenergy in Estonia*; EP Publishing: Brussels, Belgium, 2017. [CrossRef]
36. Donia, E.; Mineo, A.M.; Sgroi, F. A methodological approach for assessing businness investments in renewable resources from a circular economy perspective. *Land Use Policy* **2018**, *76*, 823–827. [CrossRef]
37. Dincer, I.; Bicer, Y. Integration of renewable energy systems for multigeneration. In *Integrated Energy Systems for Multigeneration*; Elsevier Science: Amsterdam, The Netherlands, 2020. [CrossRef]
38. Joseph, L.P.; Prasad, R. Assessing the sustainable municipal solid waste (MSW) to electricity generation potentials in selected Pacific Small Island Developing States (PSIDS). *J. Clean. Prod.* **2020**, *248*, 119222. [CrossRef]
39. Mukherjee, C.; Denney, J.; Mbonimpa, E.; Slagley, J.; Bhowmik, R. A review on municipal solid waste-to-energy trends in the USA. *Renew. Sustain. Energy Rev.* **2020**, *119*, 109512. [CrossRef]
40. Perrot, J.-F.; Subiantoro, A. Municipal Waste Management Strategy Review and Waste-to-Energy Potentials in New Zealand. *Sustainability* **2018**, *10*, 3114. [CrossRef]
41. Albores, P.; Petridis, K.; Dey, P. Analysing Efficiency of Waste to Energy Systems: Using Data Envelopment Analysis in Municipal Solid Waste Management. *Procedia Environ. Sci.* **2016**, *35*, 265–278. [CrossRef]
42. Gitelman, L.; Magaril, E.; Kozhevnikov, M.; Rada, E.C. Rada Rational Behavior of an Enterprise in the Energy Market in a Circular Economy. *Resources* **2019**, *8*, 73. [CrossRef]
43. Dobrova, K.B.; Danilochkina, N.G.; Cherner, N.V.; Dobrov, V.P.; Dobrov, P.P.; Sepiashvili, E.N. Innovational Management of Industrial Enterprises in the Energy Sector. *Eur. Res. Stud. J.* **2018**, *21*, 447–458. [CrossRef]
44. Lyaskovskaya, E.A.; Kurbangaliev, M.R. Energy Management of Industrial Enterprise. *Shs Web Conf.* **2017**, *35*, 01129. [CrossRef]
45. Păunescu, C.; Blid, L. Effective energy planning for improving the enterprise's energy performance. *Manag. Mark.* **2016**, *11*, 512–531. [CrossRef]
46. Gabriel, C.-A.; Kirkwood, J. Business models for model businesses: Lessons from renewable energy entrepreneurs in developing countries. *Energy Policy* **2016**, *95*, 336–349. [CrossRef]
47. Tchórzewska-Cieślak, B.; Pietrucha-Urbanik, K. Approaches to Methods of Risk Analysis and Assessment Regarding the Gas Supply to a City. *Energies* **2018**, *11*, 3304. [CrossRef]
48. Panepinto, D.; Zanetti, M.C.; Gitelman, L.; Kozhevnikov, M.; Magaril, E.; Magaril, R. Energy from Biomass for Sustainable Cities. In Proceedings of the IOP Conference Series: Earth and Environmental Science, Ekaterinburg, Russia, 19 May 2017; Institute of Physics Publishing, 2017; Volume 72, pp. 12–21. [CrossRef]
49. El Sheltawy, S.T.; Al-Sakkari, E.G.; Fouad, M. Waste to Energy Trends and Prospects: A Review. In Proceedings of the 6th International Conference on Solid Waste Management, Jadavpur University, Kolkata, India, 24–26 November 2016; pp. 1–9.
50. Fagerberg, J. *Innovation: A Guide to the Literature*; Oxford University Press: Oxford, UK, 2006. [CrossRef]
51. Glińska-Neweś, A.; Sudolska, A.; Karwacki, A.; Górka, J. Innovations among people. How positive relationships at work can trigger innovation creation. *E+M Èkon. A Manag.* **2017**, *20*, 84–100. [CrossRef]
52. Baregheh, A.; Rowley, J.; Sambrook, S. Towards a multidisciplinary definition of innovation. *Manag. Decis.* **2009**, *47*, 1323–1339. [CrossRef]
53. Damanpour, F.; Wischnevsky, J.D. Research on innovation in organizations: Distinguishing innovation-generating from innovation-adopting organizations. *J. Eng. Technol. Manag.* **2006**, *23*, 269–291. [CrossRef]
54. OECD. *The Measurement of Scientific, Technological and Innovation Activities Oslo Manual 2018 Guidelines for Collecting, Reporting and Using Data on Innovation*, 4th ed.; OECD Publishing: Paris, France; Luxembourg, 2018. [CrossRef]
55. OECD. *The Measurement of Scientific and Technological Activities Oslo Manual Guidelines for Collecting and Interpreting In-novation Data*, 3rd ed.; OECD Publishing: Paris, France; Luxembourg, 2005.
56. Wolff, J.A.; Pett, T.L. Small-Firm Performance: Modeling the Role of Product and Process Improvements*. *J. Small Bus. Manag.* **2006**, *44*, 268–284. [CrossRef]
57. Anwar, M. Business Model Innovation and SMEs Performance—Does Competitive Advantage Mediate? *Int. J. Innov. Manag.* **2018**, *22*, 1850057. [CrossRef]
58. Kijkasiwat, P.; Phuensane, P. Innovation and Firm Performance: The Moderating and Mediating Roles of Firm Size and Small and Medium Enterprise Finance. *J. Risk Financ. Manag.* **2020**, *13*, 97. [CrossRef]
59. The free-market innovation machine: Analyzing the growth miracle of capitalism. *Choice Rev. Online* **2002**, *40*, 40–0406. [CrossRef]
60. Chen, D.H.C.; Dahlman, C.J. *Knowledge and Development: A Cross-Section Approach*; Policy Research Working Papers; The World Bank: Washington, DC, USA, 2004. [CrossRef]
61. Prystrom, J. *Innowacje w Procesie Rozwoju Gospodarczego. Istota i Uwarunkowania*; Difin: Warszawa, Poland, 2012.
62. Altman, E.J.; Anthony, S.D.; Johnson, M.W.; Sinfield, J.V. *The Innovator's Guide to Growth: Putting Disruptive Innovation to Work*; Harvard Business Press Books: Boston, MA, USA, 2009.
63. WIPO. Statistical Country Profiles. Available online: https://www.wipo.int/ipstats/en/statistics/country_profile/profile.jsp?code=PL (accessed on 19 April 2021).
64. Gołacki, M. *Raport Roczny Urzędu Patentowego RP-2019*; Wydawnictwo Urzędu Patentowego Rzeczypospolitej Polskiej: Warszawa, Poland, 2020.

65. Skórska, E. Wybrane Wynalazki Dotyczące Odnawialnych Źródeł Energii Zarejestrowane w Polsce w Latach 2015–2019. In *Energetyka w Kierunku Nowej Polityki Energetycznej. Cykl rynki Surowców i Energii*; Kwiatkiewicz, P., Ed.; Fundacja na Rzecz Czystej Energii: Poznań, Poland, 2020; pp. 181–198.
66. Colombo, M.G.; Grilli, L. Funding Gaps? Access to Bank Loans by High-Tech Start-Ups. *Small Bus. Econ.* **2006**, *29*, 25–46. [CrossRef]
67. Angilella, S.; Mazzù, S. The financing of innovative SMEs: A multicriteria credit rating model. *Eur. J. Oper. Res.* **2015**, *244*, 540–554. [CrossRef]
68. Arranz, N.; Arroyabe, M.F.; De Arroyabe, J.C.F. Obstacles of innovation and institutional support in the cooperation agreements. *Eur. J. Innov. Manag.* **2019**, *23*, 696–712. [CrossRef]
69. Pergelova, A.; Angulo-Ruiz, F. The impact of government financial support on the performance of new firms: The role of competitive advantage as an intermediate outcome. *Entrep. Reg. Dev.* **2014**, *26*, 663–705. [CrossRef]
70. Etzkowitz, H.; Leydesdorff, L. The dynamics of innovation: From National Systems and "Mode 2" to a Triple Helix of university–industry–government relations. *Res. Policy* **2000**, *29*, 109–123. [CrossRef]
71. Carayannis, E.G.; Campbell, D.F. 'Mode 3' and 'Quadruple Helix': Toward a 21st century fractal innovation ecosystem. *Int. J. Technol. Manag.* **2009**, *46*, 201. [CrossRef]
72. Carayannis, E.G.; Barth, T.D.; Campbell, D.F. The Quintuple Helix innovation model: Global warming as a challenge and driver for innovation. *J. Innov. Entrep.* **2012**, *1*, 2. [CrossRef]
73. Kaufmann, A.; Tödtling, F. How effective is innovation support for SMEs? An analysis of the region of Upper Austria. *Technovation* **2002**, *22*, 147–159. [CrossRef]
74. Lee, S.-H.; Yigitcanlar, T.; Han, J.-H.; Leem, Y.-T. Ubiquitous urban infrastructure: Infrastructure planning and development in Korea. *Innovation* **2008**, *10*, 282–292. [CrossRef]
75. Rosenbusch, N.; Brinckmann, J.; Bausch, A. Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *J. Bus. Ventur.* **2011**, *26*, 441–457. [CrossRef]
76. Rydarowska-Kurzbauer, J. Źródła Finansowania Działalności Inwestycyjnej Przedsiębiorstw Na Przykładzie Wybranych Krajów Europy Środkowo-Wschodniej. *Studia Ekon.* **2013**, *156*, 63–72.
77. Ostaszewski, J.; Cicirko, T.; Kreczmańska-Gigol, K.; Piotr, R. *Finanse Spółki Akcyjnej*, 3rd ed.; Difin: Warszawa, Poland, 2005.
78. Quinn, R.E.; Cameron, K. Organizational Life Cycles and Shifting Criteria of Effectiveness: Some Preliminary Evidence. *Manag. Sci.* **1983**, *29*, 33–51. [CrossRef]
79. Lippitt, G.L.; Schmidt, W.H. Crises in a Developing Organization. *Harv. Bus. Rev.* **1967**, *45*, 102–112.
80. Duliniec, A. *Finansowanie Przedsiębiorstwa*; Polskie Wydawnictwo Ekonomiczne: Warszawa, Poland, 2007.
81. Michalak, A. *Finansowanie Inwestycji w Teorii i Praktyce*; Wydawnictwo Naukowe PWN: Warszawa, Poland, 2020.
82. Fisher, A.J.; Donaldson, G. Corporate Debt Capacity: A Study of Corporate Debt Policy and the Determination of Corporate Debt Capacity. *J. Financ.* **1962**, *17*, 554. [CrossRef]
83. Myers, S.C.; Majluf, N.S. Corporate financing and investment decisions when firms have information that investors do not have. *J. Financ. Econ.* **1984**, *13*, 187–221. [CrossRef]
84. Błach, J.; Wieczorek-Kosmala, M.; Trzęsiok, J. Innovation in SMEs and Financing Mix. *J. Risk Financ. Manag.* **2020**, *13*, 206. [CrossRef]
85. Modigliani, F.; Miller, M.H. The Cost of Capital, Corporation Finance and the Theory of Investment on JSTOR. *Am. Econ. Rev.* **1958**, *10*, 261–297.
86. Modigliani, F.; Miller, M.H. Corporate Income Taxes and the Cost of Capital: A Correction. *Am. Econ. Rev.* **1963**, *53*, 433–443.
87. Kraus, A.; Litzenberger, R.H. A State-Preference Model of Optimal Financial Leverage. *J. Financ.* **1973**, *28*, 911–922. [CrossRef]
88. Jensen, M.C.; Meckling, W.H. Theory of the firm: Managerial behavior, agency costs and ownership structure. *J. Financ. Econ.* **1976**, *3*, 305–360. [CrossRef]
89. Myers, S.C. Determinants of corporate borrowing. *J. Financ. Econ.* **1977**, *5*, 147–175. [CrossRef]
90. Myers, S.C. The Capital Structure Puzzle. *J. Financ.* **1984**, *39*, 574–592. [CrossRef]
91. Haugen, R.A.; Senbet, L.W. The Insignificance of Bankruptcy Costs to the Theory of Optimal Capital Structure. *J. Financ.* **1978**, *33*, 383–393. [CrossRef]
92. Duliniec, A. Wybór Źródeł Finansowania a Optymalna Struktura Kapitału w Przedsiębiorstwie. *Zesz. Nauk. Uniw. Szczecińskiego. Finans. Rynk. Finans. Ubezpieczenia* **2015**, *74*, 73–82. [CrossRef]
93. Leary, M.T.; Roberts, M.R. Do Firms Rebalance Their Capital Structures? *J. Financ.* **2005**, *60*, 2575–2619. [CrossRef]
94. Agarwal, Y. *Capital Structure Decisions Evaluating Risk and Uncertainty*; John Wiley & Sons, Inc.: Hoboken, NJ, USA, 2015. [CrossRef]
95. Gruszczyński, M. *Mikroekonometria. Modele i Metody Analizy Danych Indywidualnych*; Oficyna Wydawnicza Wolters Kluwer: Warszawa, Poland, 2012.
96. Sur, P.; Candès, E.J. A modern maximum-likelihood theory for high-dimensional logistic regression. *Proc. Natl. Acad. Sci. USA* **2019**, *116*, 14516–14525. [CrossRef] [PubMed]
97. Liang, H.; Du, P. Maximum likelihood estimation in logistic regression models with a diverging number of covariates. *Electron. J. Stat.* **2012**, *6*, 1838–1846. [CrossRef]

98. Zastempowski, M. *Innowacyjność Małego Przedsiębiorstwa*; Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika: Toruń, Poland, 2019; pp. 64–74.
99. Sok, P.; O'Cass, A.; Miles, M.P. The Performance Advantages for SMEs of Product Innovation and Marketing Resource-Capability Complementarity in Emerging Economies. *J. Small Bus. Manag.* **2015**, *54*, 805–826. [CrossRef]
100. Bertrand, O. Effects of foreign acquisitions on R&D activity: Evidence from firm-level data for France. *Res. Policy* **2009**, *38*, 1021–1031. [CrossRef]
101. Prajogo, D.I.; Ahmed, P.K. Relationships between innovation stimulus, innovation capacity, and innovation performance. *RD Manag.* **2006**, *36*, 499–515. [CrossRef]
102. Yam, R.C.; Guan, J.C.; Pun, K.F.; Tang, E.P. An audit of technological innovation capabilities in chinese firms: Some empirical findings in Beijing, China. *Res. Policy* **2004**, *33*, 1123–1140. [CrossRef]
103. Stankiewicz, M.J. *Konkurencyjność Przedsiębiorstwa. Budowanie Konkurencyjności Przedsiębiorstwa w Warunkach Globalnych*; TNOiK: Toruń, Poland, 2002.
104. Godziszewski, B. *Zasobowe Uwarunkowania Strategii Przedsiębiorstwa*; Wydawnictwo Uniwersytetu Mikołaja Kopernika: Toruń, Poland, 2001.
105. Drews, A. Zewnętrzne uwarunkowania działalności innowacyjnej polskich małych przedsiębiorstw. *Acta Univ. Nicolai Copernic. Zarządzanie* **2018**, *45*, 81. [CrossRef]
106. Grego-Planer, D. *Potencjał Konkurencyjny Ukrytych Liderów Polskiej Gospodarki*; Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika: Toruń, Poland, 2016.
107. Armstrong, G.; Kotler, P. *Marketing. Wprowadzenie*, 10th ed.; Wydawnictwo Nieoczywiste: Kraków-Warszawa, Poland, 2016.
108. Martínez-Román, J.A.; Gamero, J.; Tamayo, J.A. Analysis of innovation in SMEs using an innovative capability-based non-linear model: A study in the province of Seville (Spain). *Technovation* **2011**, *31*, 459–475. [CrossRef]
109. Zastempowski, M. *Uwarunkowania Budowy Potencjału Innowacyjnego Polskich Małych i Średnich Przedsiębiorstw*; Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika: Toruń, Poland, 2010.
110. Romijn, H.; Albaladejo, M. Determinants of innovation capability in small electronics and software firms in southeast England. *Res. Policy* **2002**, *31*, 1053–1067. [CrossRef]
111. Henrekson, M.; Johansson, D. Gazelles as job creators: A survey and interpretation of the evidence. *Small Bus. Econ.* **2010**, *35*, 227–244. [CrossRef]
112. Polish Sustainable Energy Financing Facility (PolSEFF I & II) DAI: International Development. Available online: https://www.dai.com/our-work/projects/poland-polish-sustainable-energy-financing-facility-polseff (accessed on 20 April 2021).
113. Efficiency of Energy Use in Small and Medium Sized Enterprises-Gov.pl Website. Available online: https://www.gov.pl/web/efficientSME (accessed on 20 April 2021).
114. Harel, R.; Kaufmann, D. Financing innovative SMEs of traditional sectors: The supply side. *Euromed J. Bus.* **2016**, *11*, 84–100. [CrossRef]
115. De Vasconcelos, R.B.B.; De Oliveira, M.R.G. Determinantes da Inovação em Micro E Pequenas Empresas: Uma Abordagem Gerencial. *Rev. Adm. Empresas* **2018**, *58*, 349–364. [CrossRef]
116. Tucker, J.; Lean, J. Small firm finance and public policy. *J. Small Bus. Enterp. Dev.* **2003**, *10*, 50–61. [CrossRef]
117. Kleinknecht, A. Firm size and innovation. *Small Bus. Econ.* **1989**, *1*, 215–222. [CrossRef]
118. Piwowar-Sulej, K.; Kwil, I.; Podsiadły, K. Barriers to Technological Innovation for Small Local Confectionery Companies. In Proceedings of the European Conference on Innovation and Entrepreneurship, Reading, Kalamata, Greece, 19–20 September 2019. [CrossRef]
119. Caputo, A.; Cucchiella, F.; Fratocchi, L.; Pelagagge, P.; Scacchia, F. A methodological framework for innovation transfer to SMEs. *Ind. Manag. Data Syst.* **2002**, *102*, 271–283. [CrossRef]
120. Tzadik, A. *Small and Medium Businesses in Israel and in Developing Countries*; The Knesset Research and Information Center: Jerusalem, Israel, 2007. (In Hebrew)
121. Harel, R.; Schwartz, D.; Kaufmann, D. Small businesses are promoting innovation!! Do we know this? *Small Enterp. Res.* **2019**, *26*, 18–35. [CrossRef]
122. Brodny, J.; Tutak, M. Analyzing Similarities between the European Union Countries in Terms of the Structure and Volume of Energy Production from Renewable Energy Sources. *Energies* **2020**, *13*, 913. [CrossRef]
123. Zimon, G. An Assessment of the Strategy of Working Capital Management in Polish Energy Companies. *Int. J. Energy Econ. Policy* **2019**, *9*, 552–556. [CrossRef]