risks

MDPI

Article

The Role of Financial Situation in the Relationship between Environmental Initiatives and Competitive Priorities of Production Companies in Poland

Barbara Fura

Institute of Economics and Finance, University of Rzeszów, Ćwiklińskiej Str. 2, 35-601 Rzeszów, Poland; bfura@ur.edu.pl; Tel.: +48-17-872-1698

Abstract: The paper aims to determine the role of the financial situation of production companies in the relationship between their environmental initiatives and their factors of competitiveness. The paper takes advantage of primary and secondary statistical data. The former were gathered using the diagnostic survey method, whereas the latter were obtained from the companies' financial statements. For the analysis of the primary data, structural modeling was applied. The data from the financial statements served to classify enterprises according to their financial situation. The classification was carried out with the use of Mączyńska's discriminant model. The main findings highlight that more positive effects of environmental initiatives, such as companies' increased competitiveness, were observed in cases of enterprises with good financial situations. In addition, a weaker impact of pro-environmental initiatives on the increase in companies' competitiveness was noted in enterprises in poor financial conditions. The results of this research may be potentially applied in those production companies which build their competitiveness based on activities aiming at the protection of the natural environment. They draw attention to the key factors of the competitiveness of enterprises, which are improved as a result of actions for the protection of the natural environment. The originality of the presented research lies in determining the role of the financial situation in the development of the relationship between environmental actions and company competitiveness.

Keywords: environmental initiatives; environment protection; competitive priorities; financial statement; financial risk

Citation: Fura, Barbara. 2022. The Role of Financial Situation in the Relationship between Environmental Initiatives and Competitive Priorities of Production Companies in Poland. *Risks* 10: 52. https://doi.org/10.3390/risks10030052

Academic Editor: Mogens Steffensen

Received: 7 January 2022
Accepted: 22 February 2022
Published: 1 March 2022

1. Introduction

The nature of the relationship between environmental performance and the financial performance of companies has been long-standing. It has been confirmed, so far, that environmental performance influences economic performance. This may happen through improving production processes, and increasing demand from the consumption side (Nishitani and Kokubu 2020). However, the relationship between environmental and financial performance has remained a point of discord among researchers because of the lack of an unequivocal consensus about its direction, sign, and significance (Cai and Yang 2014; Lahouel et al. 2022; Nishitani and Kokubu 2020).

The relationship mentioned above is highly important for production companies that use more natural resources in their processes than service companies. Pollution-intensive businesses have often been criticized for their insufficient effort in protecting the natural environment (Govindan et al. 2014; Shrivastava 1994). These businesses face increasing legal and social pressures to undertake more environmental actions. Namely, they are obliged to incorporate environmental priorities into their overall business strategies (Adomako and Tran 2022; Grzebyk and Stec 2015). These can vary from eco-design to green purchasing, green manufacturing, or green logistics (Trujillo-Gallego et al. 2021). Among the results of an environmentally-friendly attitude of companies are less pollution, waste reduction, and

a limitation of raw material consumption. This may lead to cost reduction, better efficiency, and an improvement in competitiveness.

Production companies can build their competitiveness on several priorities, namely: cost, flexibility, quality, and delivery (Hayes and Wheelwright 1984; Skinner 1969). They represent manufacturers' choice of production tasks and operations (Figure 1).

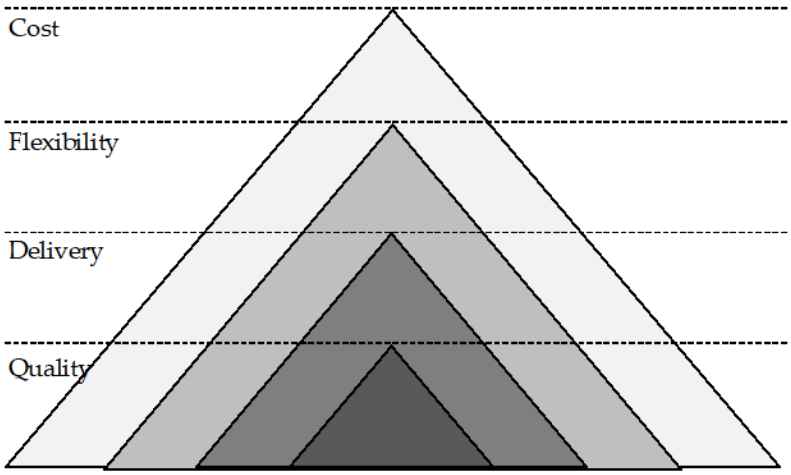

Figure 1. Competitive priorities model. Source: (Bortolotti et al. 2015; Boyer and Lewis 2002).

The base of the model is quality. It means a low rate of product defects, reliability of operation, compliance with standards, and a low level of harmfulness/no harmfulness to the natural environment. Delivery is an issue connected with time. It describes how quickly the product is supplied to the client. This means the reliable (on time) and fast (short delivery time) delivery of products. Flexibility means the ability of the production system to adjust to changes in designing and planning the production volume and diversity, e.g., changes in assortment, designing new devices and taking down the old ones, and quick updates to changes in product designs. Cost means the ability to produce and offer a product at low prices by reducing the overall costs of production, labor costs, cost of raw materials and consumables, and reducing the duration of the production cycle (Russell and Millar 2014).

However, apart from these fundamental elements, different authors also consider other priorities, for example, innovation, customer service, environmental protection, and marketing elements, such as sales promotion, advertising, customer relations, and the sales force. In contrast, some authors exclude one or more aspects out of the four main competitive priorities which are commonly accepted (Díaz-Garrido et al. 2011).

This study on the relationship between the environment and economics defines environmental protection as minimizing the consequences of production activity in various environmental components of the environment. Actions for environmental protection are represented in the paper by five environmental initiatives, i.e., pollution prevention, material recycling, waste reduction, reducing fuel and energy consumption, and limiting water consumption (Schoenherr 2012). The thorough and complete implementation of these initiatives requires a fundamental rethinking within the firm concerning products, product design, investments in manufacturing assets, processes, materials, sourcing, life cycle cost management, total cost ownership, and supplier management. Nevertheless, other green initiatives, such as the design of environmentally-friendly products and processes, the use of integrated technologies, and the implementation of environmental management systems (Wysocki 2021), may also contribute to improvements in environmental results, and thus, may improve companies' competitiveness.

Adopting and improving environmental initiatives can be costly for firms. These firms may first ensure that their financial position is stable before investing in environmental practices (Abban and Hasan 2021).

The paper aims to determine the role of the financial situation of production companies in the relationship between their environmental initiatives and the factors of competitiveness. The research model is presented in Figure 2.

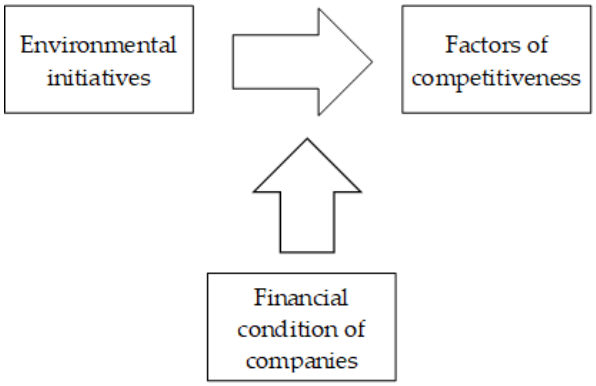

Figure 2. Research model.

We suggest in the paper that differences in the influence of environmental initiatives on the competitive priorities of companies depend on the financial situation of enterprises that introduce the environmental initiatives. Thus, we hypothesize that:

Hypothesis 1 (H1). *A higher positive influence of environmental initiatives is observed in companies in a good financial situation in comparison to companies in a poor financial condition.*

The remaining part of the paper is organized in the following way: Section 2 presents a literature review on measuring the relationship between environmental and financial performance. Section 3 demonstrates sources of both primary and secondary data, and it briefly describes the methods of data analysis. Section 4 contains the research findings, namely sample selection, sample characteristics, companies' achievements both in environmental initiatives and factors of competitiveness, as well as the final models showing the influence of environmental initiatives on the competitive priorities of companies. Section 5 summarizes the results, and presents general findings. There is also a Limitations section included at the end of the paper.

2. Literature Review

The neoclassical environmental economics concerning environmental and financial performance show a negative relationship resulting from explicit and implicit costs of environmental protection actions (Chen et al. 2015). It has been forcefully argued that higher environmental standards and stringent national environmental regulations negatively affect companies' competitiveness, as they impose additional unrecoverable costs, and generally constitute a competitive disadvantage. Therefore, companies that comply with environmental regulations bear opportunity costs that negatively affect profitability, prices, innovation, efficiency, and profitable investment opportunities (Walley and Whitehead 1994).

In contrast, Porter (1990), and Porter and Van der Linde (1995) question the conventional model, and suggest that improved environmental performance may be beneficial for both companies and society. According to this view, the improvement in environmental performance, which is a consequence of more stringent, but well-designed, environmental regulations, may lead to a 'win-win' situation, with an increased competitiveness of companies. This may be achieved by stimulating innovation, developing more efficient processes, improving productivity, offsetting compliance costs, and opening new market opportunities (Xie et al. 2017).

The opinion that environmentally-friendly initiatives translate into an increased corporate competitive advantage and improved corporate operational results has been confirmed

on the basis of empirical studies carried out so far (e.g., Melnyk et al. 2003; Russo and Fouts 1997; Wiengarten et al. 2013; Yang et al. 2010). However, despite the expected positive relationship between the variables, the presented findings sometimes provide conflicting results and opinions on the real economic benefits of environmental initiatives undertaken by companies (Montabon et al. 2007).

So far, research on the relationships between a company's environmental and economic activities has not yielded unequivocal outcomes. The observed disagreement among researchers is caused by the diversity of conditions in which the research is conducted (López-Gamero et al. 2009). The differences in research results depend on the type of activity undertaken, the sector of industry, the scale of its activities, and other internal features. In addition to the company's characteristics, regional circumstances that constitute the business environment are also influenced by the outcomes of pro-environmental activities. Moreover, the majority of research provides broad information on the benefits accruing from adopting pro-environmental attitudes by companies (e.g., Ociepa-Kubicka et al. 2021; Chwiłkowska-Kubala et al. 2021; Tzouvanas et al. 2020).

In publications on the subject area, it is widely recognized that the adoption of similar attitudes enhances companies' competitive factors. According to Adda et al. (2021), corporate sustainability practices are vital to business, and thus, targeting corporate sustainability actions and strategies can stimulate competitive advantages in terms of profitability and long-term survival. However, it is characteristic that most statements concerning such influence are an overgeneralization of the facts. There is a lack of analytical studies which thoroughly consider the impact of specific environmental initiatives on the competitive priorities of production companies. It should be also noted that many relationships between environmental initiatives and competitive priorities appear significant in one study (Jabbour et al. 2012; Nishitani and Kokubu 2020), but insignificant in another (Feldman et al. 1997; Wagner et al. 2002). As observed by Cai and Yang (2014), the differences in research results rely on the fact that these studies have not explicitly specified performance limits in their models.

It can, therefore, be agreed that some business entities can, in given conditions, improve their competitiveness relative to others through their intensified activities in areas of environmental protection. It is desirable that in further studies on relationships between a company's environmental and economic activities, attention should be paid to attempts to define conditions under which companies' pro-environmental activities can enhance their functional efficiency and competitiveness.

The present study fills an identified research gap. On the basis of a nationwide representative research sample, it determined the role of companies' financial situation in the development of the relationship between environmental initiatives and the competitive priorities of companies. The financial condition of companies is perceived as a factor that can differentiate the impact of environmental protection activities on companies' competitiveness.

3. Data and Method

This paper makes use of both primary and secondary data. The primary data were gathered using the diagnostic survey method. The information on companies was taken from the international database called the Emerging Markets Information Service (2018) (https://www.emis.com/pl accessed on 21 January 2018). The research covered companies whose main economic activity was included in sector 31—production in line with the North American Industry Classification System (NAICS). According to the EMIS database, the number of companies operating in this sector amounted to 21,317 (as of 21 January 2018, and excluding companies without official financial transactions). The survey was conducted in the first half of 2018.

The gathered primary data formed two groups of variables: environmental initiatives as the first one, and companies' factors of competitiveness as the second one. In order to determine the scale of companies' environmental initiatives, the researchers took advantage

of the enterprises' self-assessment of the involvement in actions aiming at environmental protection. The companies evaluated the degree of using their financial, human, time, and other resources spent during the last three years on: pollution prevention—i1, material recycling—i2, waste reduction—i3, limiting fuel and energy consumption—i4, and reduction of water consumption—i5. The degree of companies' investments in environmental initiatives was demonstrated on a five-point scale.

In the presented research, the criteria of quality, delivery, flexibility, and cost were assumed as the fundamental factors of companies' competitiveness (Bozarth and Handfield 2007; Cai and Yang 2014; Schoenherr 2012). The quality was defined by the following distinctive features of the offered products: characteristics—j1, performance—j2, reliability—j3, and generally perceived quality—j4. The delivery was determined by the evaluation of the following conditions: the efficiency of accepting the order—d1, time of the order execution—d2, time of the product delivery—d3, and the product compliance with the order—d4. Another priority was defined as flexibility, in terms of launching new/withdrawing old products—e1, modifying the offer in response to customers' changing demands—e2, adjusting the volume of production to the level of demand—e3, and adapting the conditions of delivery to match customers' expectations—e4. To assess the level of cost, the following costs were estimated: indirect costs of production—k1, total costs of production—k2, costs of raw materials and production materials—k3, and costs of environmental protection in the company—k4. The companies rated each of the competitiveness factors by assigning marks to their discriminants on a scale from 1 to 5.

Both environmental initiatives and factors of competitiveness were regarded as latent variables. For the analysis of the impact of environmental initiatives on the factors of competitiveness, structural equation modeling (SEM) was applied. It is a statistical method for testing and estimating casual relationships on the basis of statistical data, including qualitative data. The SEM technique is particularly useful in research where hypothetical structures, usually called 'models', are subjected to tests indicating to what extent they are confirmed in a data set (Konarski 2009).

Generally, the research procedure that uses structural modeling consists of successive stages (Hershberger and Marcoulides 2013): firstly, a hypothetical theoretical model is built; secondly, it is checked whether this theoretical model matches the data; and thirdly, the specific parameters of the model are evaluated. Since the assumption of multivariate normal distribution was met neither in the case of environmental initiatives nor factors of competitiveness, the method of diagonally weighted least squares (DWLS) was used. To assess the degree of structural model correctness, the researchers applied measures such as $\chi 2$ /df, root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). The calculations were carried out in the R program (The R Project for Statistical Computing 2019) (https://www.r-project.org accessed on 25 May 2019).

Apart from the primary data, the research also took advantage of the secondary data. Their sources were the companies' financial statements for the period from 2012 to 2017, available through the EMIS database. Based on the financial data, we determined the average financial condition of the companies for the years 2012–2017, and classified the examined enterprises as well.

In order to determine companies' financial situation, the Mączyńska (1994) discriminant model was used. It is illustrated by the linear function:

$$ZM = 1.5X_1 + 0.08X_2 + 10.0X_3 + 5.0X_4 + 0.3X_5 + 0.1X_6, \quad (1)$$

where:
X_1—(gross profit + depreciations)/total liabilities,
X_2—gross profit/total liabilities,
X_3—gross profit/balance sheet total,
X_4—gross profit/sales revenues,
X_5—value of inventory/sales profit,
X_6—sales revenues/balance sheet total.

A negative value of ZM means that a company is at risk of bankruptcy; a positive value of ZM, yet less than 1, means a weak company, but not at risk of going bankrupt; a positive value within the range of 1–2 means a rather sound company; and a value above 2 shows that a company is in a very good condition (Wieprow and Barlik 2017). To classify the companies, we distinguished two groups, i.e., companies in a very good or good financial situation ($ZM \geq 1$), and companies in a very bad or bad financial situation ($ZM < 1$).

4. Results and Discussion

4.1. Sample Selection

A total of 1016 companies were invited to take part in the research. Out of this number, 780 entities agreed to participate in the research, providing the degree of sample implementation at a level of 76.77%. With the given size of the general population (21,317 companies), confidence level of 95%, and unknown fraction/proportion (the assumed value was 0.5), the maximum permissible error of estimation was 3.44%. Both the response rate and the level of the maximum permissible error of estimation were regarded as satisfactory.

The representativeness of the sample was assessed by comparing the obtained distribution of the companies' number in the sample with the distribution of the companies' number in the general population. The location of companies' headquarters according to macro-regions (Nomenclature of Territorial Units for Statistics 1—NUTS 1 2021) (Table 1) was adopted as a comparative criterion.

Table 1. Distribution of the enterprises in the sample vs. in the population by macro-regions.

Macro-Region	Sample [%]	Population [%]
Southern	18.33	18.38
North-Western	17.44	19.40
South-Western	10.51	10.91
Northern	16.03	18.28
Central	8.46	7.83
Eastern	13.59	9.12
Mazowieckie Voivodeship macro-region	15.64	16.07
Total	100	100

Source: (Fura 2020).

4.2. Sample Characteristics

The highest percentage of the companies in the sample were those located in the Southern macro-region (18.33%), then in North-Western (17.44%), and in the Northern macro-region (16.03%). A significant response rate (15.64%) came from the companies located in the Mazowieckie Voivodeship macro-region, constituting a separate macro-region. Responses of the companies from the Eastern macro-region amounted to 13.59% of all of the answers, whereas the ones from the South-Western and Central macro-regions represented 10.51% and 8.46%, respectively.

Micro-enterprises accounted for almost 19% of the examined companies, small entities for 26.5%, and 27.3% were medium-sized enterprises. In total, the share of SMEs (micro-, small-, and medium-sized companies) in the sample was 72.8%. The remaining 27.2% were large enterprises. The share of SMEs in the sample was lower than in the total economy, which, in 2017, amounted to 99.8% (micro—96.5%, small—2.6%, and medium-sized—0.7%) according to (Central Statistical Office 2017).

4.3. Companies' Environmental Initiatives

Among the quality indicators, the overall quality of products was assessed the highest, and it obtained a total of 88.3% of very high and high rates (N = 689). Product characteristics were ranked similarly—this quality indicator obtained 87.3% of very high and high rates (N = 681). Product reliability and their performance were assessed slightly lower: 83.2% (N = 649) and 79.2% (N = 618) of very high and high rates, and 14.0% (N = 109) and 15.0%

(N = 117) of average rates, respectively. These quality indicators also obtained most *non-applicable* responses: 2.1% (N = 16) and 5.5% (N = 43), respectively. Only a few companies rated particular quality features low and very low. The highest number of such rates was assigned to product reliability—0.8%.

In the case of delivery conditions, the evaluation was slightly more diversified than in the case of quality. In this area of activity, the companies assessed product compliance with the order with the highest rate, and the time of product delivery with the lowest. These indicators of the factor of delivery obtained 87.6% (N = 683) and 80.6% (N = 629) of very high and high rates, respectively.

As for flexibility indicators, it was the offer modification in response to customers' changing demands that was rated the highest (80.6% of very high and high rates, N = 629). The remaining discriminants of this competitive factor obtained a very similar percentage of very high and high rates (from 77.1 to 78.6%), as well as of average ones (from 17.2 to 19.0%). The highest number of low and very low rates was assigned to flexibility in terms of adjusting the volume of production to the demand reported on the market—this was 2.3% (N = 18).

The evaluation of the companies' costs varied from the previous assessments. It was also the most problematic for the examined enterprises, which was confirmed by a relatively high percentage of *non-applicable* responses (2.1–2.9%), and a lack of data at the level of 1.2–1.3%. Each cost component obtained the highest number of average rates, i.e., approximately 60%. Very high and high costs were most frequently indicated in the case of raw materials and materials. In the view of 30.6% of the entities (N = 239), such costs were higher than in the case of their competitors. Indirect costs of production were also regarded as relatively high. According to the examined companies, costs of environmental protection constituted a lesser burden.

The questionnaire provided the following examples of such costs that were evaluated by the companies: costs of pollution prevention, costs of using the environment, and costs of environmental management, for example, ISO 14001, Eco-management and Audit Scheme (EMAS), as well as other costs. Almost 18% of the companies found costs of environmental protection very low or low, whereas they were high or very high for slightly more than 17% of the enterprises. The assessment of this discriminant of costs was also the most problematic for the examined companies, which was confirmed by the highest total percentage of *non-applicable* responses, and a lack of data (4.2%).

4.4. SEM Results

Following the verification and acceptance of measurement models (CFA1, CFA2, CFA3, CFA4), full structural models (SEM1, SEM2, SEM3, SEM4) were estimated[1]. In these initial structural models, the values of factor loadings and reproduced variances were similar to the values obtained in the case of CFA models. Similarly, all path coefficients and covariances in the SEM1–SEM4 models were positive and statistically significant. Having analyzed the modification indices of each of the SEM1, SEM2, SEM3, and SEM4 models, a decision was made to take into account the correlation between the residuals i1 and i2. The theoretical justification for the correlation of the above-mentioned residuals was a strong positive relationship between preventing pollution (variable i1), and using raw material and material recycling by companies (variable i2). The modification indices suggesting the correlation between the residuals i1 and i2 amounted to: 22.660, 18.896, 21.298, and 23.384 in the SEM1, SEM2, SEM3, and SEM4 models, respectively. These were also the indices with the highest values in the construct of environmental initiatives in each of the SEM1–SEM4 models. Taking into account the correlation between residuals i1 and i2 significantly improved the fit of the SEM models to empirical data.

In regard to companies' environmental initiatives in case of the first model (SEM1*), the $\chi 2$ statistic ceased to be statistically significant, and RMSEA dropped to 0.011, and SRMR to 0.022. All path coefficients varied significantly from zero and, by the expectations, they had a positive sign. As for the second model (SEM2*), the $\chi 2$ statistic was still statistically

significant; however, the measure ($\chi 2/df$) accounted for 3.02, and it did not exceed the threshold value set at the level of 5. The value of RMSEA fell from 0.067 to 0.053, and the value of SRMR remained at the same level (0.034). Similarly to the case of the SEM1* model, in the SEM2* model, the values of paths were positive and statistically significant. The correlation of the residuals i1 and i2 improved the fit of the SEM3 model as well. In the new model (SEM3*), the $\chi 2$ statistic was statistically insignificant, RMSEA was at the level of 0.025, and SRMR decreased from 0.025 to 0.022. The modification of the SEM models had a positive influence on the fit of the model of environmental initiatives→cost. This fit measured with RMSEA came close to perfect, as the value of RMSEA fell from the level of 0.040 to 0.000. The value of the SRMR index decreased as well—from 0.018 to 0.016. The values of path coefficients in the SEM and SEM* models were the same, and they did not differ from the values of path coefficients of the CFA models.

Table 2 presents the summary of the correlations between the latent variable of environmental initiatives, and the latent variables of quality, delivery, flexibility, and cost, which were demonstrated by structural equation modelling (SEM1*–SEM4* models).

Table 2. Interactions between environmental initiatives and factors of competitiveness.

No.	Exogenous Latent Variable	Direction of Relationship	Endogenous Latent Variable	Estimate	Std. Err.	z-Value	*p*-Level	Std. lv.	Std. All	RMSEA	SRMR
SEM1*	Environmental initiatives	—→	quality	0.533	0.034	15.789	0.000	0.515	0.515	0.011	0.022
SEM2*	Environmental initiatives	—→	delivery	0.598	0.031	19.456	0.000	0.554	0.554	0.053	0.034
SEM3*	Environmental initiatives	—→	flexibility	0.547	0.028	19.440	0.000	0.596	0.596	0.025	0.022
SEM4*	Environmental initiatives	—→	cost	0.089	0.039	2.298	0.022	0.100	0.100	0.000	0.016

Legend: Std. err.—standard error, z-value—z-statistics value, *p*-level—test statistics level, Std. lv—latent variables have been standardized, Std. all—both the latent and the observed variables have been standardized (Rosseel 2012), RMSEA—acceptable level less than 0.08 (more strictly, less than 0.05), SRMR—acceptable level less than 0.08 (more strictly, less than 0.05) (Schermelleh-Engel et al. 2003). Source: (Fura 2020).

The first model demonstrated that the enhancement of companies' actions aiming at the realization of environmental initiatives, and starting from the reduction of the amount of generated waste (i3), material/raw material recycling (i2), followed by the reduction of fuel and energy consumption (i4), and preventing pollution (i1), has a statistically important influence on the improvement of companies' operational activity in terms of quality. This improvement resulted from the enhancement of products' efficiency (j2), developing product features (j1), and boosting product reliability (j3). The scale of this impact was expressed by the correlation coefficient (standardized coefficient of covariance), which had a value of 0.515 in the case of the first model. On the other hand, when applying the non-standardized path coefficients of the above model (SEM1*) to all the statements of the same five-point scale, it was found that a result higher by one point on the scale of environmental initiatives was translated into a result higher by 0.533 points on the scale measuring the competitive priority of quality.

A stronger significant impact of companies' actions aiming at natural environment protection was noted in case of the second considered priority of competitiveness, i.e., delivery. These actions involved reducing the amount of generated waste (i3), material/raw material recycling (i2), reducing fuel and energy consumption (i4), and preventing pollution (i1), and it was estimated how they improved companies' performance in terms of delivery by shortening the time of the order execution (d2), shortening the time of the product delivery (d3), and compliance of products with the order (d4), expressed by the correlation coefficient. The strength of this influence was set at the level of 0.554.

A further correlation, similar in strength to that demonstrated in the SEM2* model, was observed in the model regarding the influence of environmental initiatives on another considered factor of competitiveness, i.e., flexibility (SEM3*). Environmental initiatives,

such as reducing the amount of generated waste—i3, material/raw material recycling—i2, reducing fuel and energy consumption—i4, and preventing pollution—i1, had a statistically significant impact on the companies' operational results in terms of widely interpreted flexibility. This priority was mainly expressed through e3—adjusting the volume of production to the level of demand, e4—adapting the conditions of delivery to match customers' expectations, and e1—launching new/withdrawing old products. The strength of the correlation between environmental initiatives and the priority of flexibility was set at the level of 0.596.

A statistically significant correlation was also noted in the case of the fourth analyzed SEM model (SEM4*). The companies' actions aimed at environmental protection, and expressed by variables i3, i2, i4, and i1, had a significant impact on the fourth considered priority of competitiveness, i.e., cost. This construct was particularly reflected by the variables such as k3—total costs of production, k1—indirect costs of production, and k3—costs of raw materials and production materials. The strength of the impact of the latent variable of environmental initiatives on the competitive priority of cost was expressed by the standardized covariance coefficient (i.e., correlation coefficient), and it was only 0.101.

The basis for the verification of the assumed research hypothesis was structural modeling with a moderating variable for which the researchers used the financial situation of the examined enterprises. There were two classification groups of the distinguished companies: the ones in a very good or good financial situation, and those in a very bad or bad condition. Table 3 demonstrates the results of this modeling.

Table 3. Correlations between environmental initiatives and the factors of competitiveness according to the financial situation of companies.

Group	Exogenous Latent Variable	Direction of Relationship	Endogenous Latent Variable	Estimation	Std. Err.	z-Value	*p*-Level	Std. lv.	Std. All	RMSEA	SRMR
Financial situation: very good and good	Environmental initiatives	—→	quality	0.577	0.042	13.576	0.000	0.552	0.552	0.000	0.023
	Environmental initiatives	—→	delivery	0.651	0.037	17.574	0.000	0.587	0.587	0.044	0.032
	Environmental initiatives	—→	flexibility	0.548	0.036	15.024	0.000	0.593	0.593	0.000	0.019
	Environmental initiatives	—→	cost	0.128	0.052	2.445	0.014	0.133	0.133	0.000	0.018
Financial situation: very bad and bad	Environmental initiatives	—→	quality	Impossible to estimate due to the insufficient number of the lowest indications of the j1 variable category							
	Environmental initiatives	—→	delivery	0.516	0.051	10.193	0.000	0.500	0.500	0.046	0.043
	Environmental initiatives	—→	flexibility	0.545	0.041	13.239	0.000	0.603	0.603	0.064	0.038
	Environmental initiatives	—→	cost	0.023	0.057	0.410	0.682	0.028	0.028	0.000	0.029

Source: (Fura 2020).

Environmental initiatives of companies in a good financial situation had a positive influence on the improvement of performance in terms of generally perceived quality. A one-point increase in the level of initiatives resulted in an increase of 0.557 points on the scale of quality. A similar impact was noted with regards to the priorities of delivery and flexibility, in which the effect of a one-point increase on the scale of initiatives caused an increase of 0.651 and 0.548 points, respectively. The translating of companies' environmental initiatives into a decrease in widely interpreted production costs was noted to a much lesser extent. Although such influence was statistically significant, its strength appeared to be weak. The impact of environmental initiatives on the improvement of enterprises' competitiveness was also observed in the group of companies in a bad financial situation, but only in terms of the priorities of delivery and flexibility. However, this impact was much weaker in comparison to companies in a good financial situation. When the involvement of companies in a poor financial situation increased by one point on the scale of environmental initiatives, it was followed by an increase on the scale of delivery and flexibility of 0.516

and 0.545, respectively. Unfortunately, it was not possible to estimate the SEM model in the case of the priority of quality; hence, a similar comparison was prevented. In turn, the correlation between environmental initiatives and the competitive priority of cost was statistically insignificant in the case of companies in a poor financial situation.

5. Conclusions

The growing public awareness of environmental problems caused by business activities has resulted in increased political and social expectations for companies to reduce the negative impacts of their activities on the environment. The ability of companies to manage their environmental results has become a strategic demand for modern companies. Investing in environmental practices can help to improve a company's competitive position, and can result in improvements in its operating performance.

The presented research aimed to determine the role of enterprises' financial situation in developing the relationship between environmental initiatives of production companies, and their priorities of competitiveness (quality, delivery, flexibility, and cost).

In the case of the quality priority, it was not possible to estimate the structural model in the group of companies in a poor financial situation—due to the insufficient number of the lowest indications for the category of the indicator variable of product characteristics (j1). For that reason, a separate model for companies in a good financial situation was assessed, and its results were presented in comparison to the general model. The impact of environmental initiatives on the priority of quality was stronger in the case of companies in a good financial situation than in the case of all the companies. On this basis, it was concluded that companies in a good financial situation may expect a stronger effect of improving their widely-interpreted quality of production, and to a greater extent than entities in a poor condition.

Companies in a good situation are usually more efficient in turning the result of increased investments in environmental protection into the improvement of production quality. As for companies in a poor condition: firstly, it may be anticipated that they lack the knowledge, skills, or material resources essential to overcome an unfavorable situation. Secondly, issues of environmental protection are less significant for these companies than just maintaining the financial liquidity and the enterprise survival. Thirdly, investments in actions aiming at environmental protection are more difficult to conduct there.

Regarding the priority of delivery, structural models were assessed both for companies in a good and poor financial situation. The impact of environmental initiatives on the competitive priority of delivery was stronger in the case of enterprises in a good financial condition.

Similarly, for the priority of flexibility, separate models were created for the groups of compared companies, which were distinguished by their financial situation. The impact of environmental initiatives on the priority of flexibility was comparable in both groups. This means that the effect of the improvement in flexibility was similar in the case of companies in both good and poor financial situations.

The impact of environmental actions on the last considered priority, i.e., cost, was clearly distinct in the groups of companies subjected to the comparison. A stronger influence of environmental initiatives on the priority of cost was observed in the case of companies in a good financial condition compared to enterprises in a poor financial situation. Therefore, companies in a good condition may expect greater effects in terms of reducing production costs. Such an effect may be practically unnoticeable in enterprises in a poor situation.

Summarizing its verification, the proposed hypothesis was stated to be partially positively verified. It was found to be true in the case of such priorities as delivery and cost, and it was partially confirmed for the priority of quality. However, it was not possible to formulate clear conclusions in the case of the priority of flexibility.

The presented research may become a source of motivation for further studies on widely-interpreted relationships between the environmental and economic activity of

companies. It shows that environmental protection initiatives are becoming an area for manufacturing companies' improvement. Research results are useful both at micro- and macro-economic levels, for example, when designing priorities for regional policies, and methods of their implementation. The studies to be conducted in Poland will pose pioneering challenges in areas of diagnosis and inference on the issue being undertaken. The research results provide knowledge for decision-makers from other countries responsible for implementing the model of an economy based on knowledge and innovation. The paper thus constitutes a starting point in diagnosing the competitiveness of economic entities in the realities of concern for the natural environment.

6. Limitations

The presented research has some limitations. Firstly, the companies' own opinions were used for estimating their involvement in environmental initiatives, and the importance of the priorities of competitiveness. Secondly, the research adopted a limited set of environmental initiatives as a typical one for production companies. The use of a broader range of objective measures, the flexibility to choose from environmental initiatives, and correlating environmental circumstances with characteristics of companies would definitely enrich the research results. However, it would probably create numerous obstacles, including the ones with gaining empirical data for analyses while limiting the scale of the conducted research.

Funding: The presented research was founded by the National Science Centre, Poland (grant no. 2016/23/D/HS4/03007).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The author declares no conflict of interest.

Note

[1] Detailed results of the models CFA1–CFA4 and SEM1–SEM4 with the modification indices were presented in (Fura 2020).

References

Abban, Abdul Rashid, and Mohammad Zahid Hasan. 2021. The causality direction between environmental performance and financial performance in Australian mining companies—A panel data analysis. *Resource Policy* 70: 101894. [CrossRef]

Adda, Godfrey, Ghulam Ahmed Bin Dokor, John Bosco Azigwe, and Nii Afotey Odai. 2021. Management commitment and corporate sustainability integration into small and medium-scale enterprises: A mediation effect of strategic decision-making. *Economics, Management and Sustainability* 6: 6–22. [CrossRef]

Adomako, Samuel, and Mai Dong Tran. 2022. Sustainable environmental strategy, firm competitiveness, and financial performance: Evidence from the mining industry. *Resource Policy* 75: 102515. [CrossRef]

Bortolotti, Thomas, Pamela Danese, Barbara B. Flynn, and Pietro Romano. 2015. Leveraging fitness and lean bundles to build the cumulative performance sand cone model. *International Journal of Production Economics* 162: 227–41. [CrossRef]

Boyer, Kenneth K., and Marianne W. Lewis. 2002. Competitive priorities: Investigating the need for trade-offs in operations strategy. *Production and Operations Management* 11: 9–20. [CrossRef]

Bozarth, Cecil C., and Robert B. Handfield. 2007. *Wprowadzenie do Zarządzania Operacjami i Łańcuchem Dostaw: Kompletny Podręcznik Logistyki i Zarządzania Dostawami*. Gliwice: Helion.

Cai, Shaohan, and Zhilin Yang. 2014. On the relationship between business environment and competitive priorities: The role of performance frontiers. *International Journal of Production Economics* 151: 131–45. [CrossRef]

Central Statistical Office. 2017. *Statistical Yearbook of Industry—Poland*; Warsaw: Central Statistical Office. Available online: https://stat.gov.pl/obszary-tematyczne/roczniki-statystyczne/roczniki-statystyczne/rocznik-statystyczny-przemyslu-2017,5,11.html (accessed on 25 June 2019).

Chen, Lujie, Andreas Feldmann, and Ou Tang. 2015. The relationship between disclosures of corporate social performance and financial performance: Evidences from GRI reports in manufacturing industry. *International Journal of Production Economics* 170: 445–56. [CrossRef]

Chwiłkowska-Kubala, Anna, Szymon Cyfert, Kamila Malewska, Katarzyna Mierzejewska, and Witold Szumowski. 2021. The Relationships among Social, Environmental, Economic CSR Practices and Digitalization in Polish Energy Companies. *Energies* 14: 7666. [CrossRef]

Díaz-Garrido, Eloísa, María Luz Martín-Peña, and José María Sánchez-López. 2011. Competitive priorities in operations: Development of an indicator of strategic position. *CIRP Journal of Manufacturing Science and Technology* 4: 118–25. [CrossRef]

Emerging Markets Information Service. 2018. Available online: https://www.emis.com/pl (accessed on 21 January 2018).

Feldman, Stanley J., Peter A. Soyka, and Paul G. Ameer. 1997. Does improving a firm's environmental management system and environmental performance result in a higher stock price? *The Journal of Investing* 6: 663–80. [CrossRef]

Fura, Barbara. 2020. *Wpływ Inicjatyw Środowiskowych na Konkurencyjność Przedsiębiorstw Produkcyjnych w Polsce*. Prace Naukowe Wydziału Ekonomii, Seria: Monografie i Opracowania, 26. Rzeszów: Wyd. Uniwersytetu Rzeszowskiego.

Govindan, Kannan, Devika Kannan, and K. Madan Shankar. 2014. Evaluating the drivers of corporate social responsibility in the mining industry with multi-criteria approach: A multi-stakeholder perspective. *Journal of Cleaner Production* 84: 214–32. [CrossRef]

Grzebyk, Mariola, and Małgorzata Stec. 2015. Sustainable Development in EU Countries: Concept and Rating of Levels of Development. *Sustainable Development* 23: 110–123. [CrossRef]

Hayes, Robert. H., and Steven C. Wheelwright. 1984. *Restoring Our Competitive Edge: Competing through Manufacturing*. New York: John Wiley & Sons.

Hershberger, Scott L., and George A. Marcoulides. 2013. The problem of equivalent structural models. In *Structural Equation Modeling: A Second Course*. Charlotte: Information Age Publishing, pp. 3–39.

Jabbour, Charbel José Chiappetta, Eliciane Maria Da Silva, Ely Laureano Paiva, and Fernando Cesar Almada Santos. 2012. Environmental management in Brazil: Is it a completely competitive priority? *Journal of Cleaner Production* 21: 11–22. [CrossRef]

Konarski, Roman. 2009. *Modele Równań Strukturalnych. Teoria i Praktyka*. Warszawa: Wyd. Naukowe PWN.

Lahouel, Béchir Ben, Lotfi Taleb, Younes Ben Zaied, and Shunsuke Managi. 2022. Business case complexity and environmental sustainability: Nonlinearity and optimality from an efficiency perspective. *Journal of Envionmental Management* 301: 113870. [CrossRef] [PubMed]

López-Gamero, María D., José F. Molina-Azorín, and Enrique Claver-Cortés. 2009. The whole relationship between environmental variables and firm performance: Competitive advantage and firm resources as mediator variables. *Journal of Environmental Management* 90: 3110–21. [CrossRef] [PubMed]

Mączyńska, Elżbieta. 1994. Ocena kondycji przedsiębiorstwa (Uproszczone metody). *Życie Gospodarcze* 38: 42–45.

Melnyk, Steven A., Robert P. Sroufe, and Roger Calantone. 2003. Assessing the impact of environmental management systems on corporate and environmental performance. *Journal of Operational Management* 21: 329–51. [CrossRef]

Montabon, Frank, Robert Sroufe, and Ram Narasimhan. 2007. An examination of corporate reporting, environmental management practices and firm performance. *Journal of Operational Management* 25: 998–1014. [CrossRef]

Nishitani, Kimitaka, and Katsuhiko Kokubu. 2020. Can firms enhance economic performance by contributing to sustainable consumption and production? Analyzing the patterns of influence of environmental performance in Japanese manufacturing firms. *Sustainable Production and Consumption* 21: 156–69. [CrossRef]

Nomenclature of Territorial Units for Statistics 1—NUTS 1. 2021. Available online: https://stat.gov.pl/statystyka-regionalna/jednostki-terytorialne/klasyfikacja-nuts/klasyfikacja-nuts-w-polsce/ (accessed on 29 January 2021).

Ociepa-Kubicka, Agnieszka, Iwona Deska, and Ewa Ociepa. 2021. Organizations towards the evolution of environmental management tools ISO 14001 and EMAS. *Energies* 14: 4870. [CrossRef]

Porter, Michael E. 1990. The Competitive advantage of nations. *Harvard Business Review* 90: 73–91.

Porter, Michael E., and Claas Van der Linde. 1995. Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives* 9: 97–118. [CrossRef]

Rosseel, Yves. 2012. Lavaan: An R package for structural equation modeling. *Journal of Statistical Software* 48: 1–36. [CrossRef]

Russell, Suzana N., and Harvey H. Millar. 2014. Competitive priorities of manufacturing firms in the Caribbean. *IOSR Journal of Business and Management* 16: 72–82. [CrossRef]

Russo, Michael V., and Paul A. Fouts. 1997. A Resource-Based Perspective on Corporate Environmental Performance and Profitability. *Academic Management Journal* 40: 534–59.

Schermelleh-Engel, Karin, Helfried Moosbrugger, and Hans Müller. 2003. Evaluating the Fit of Structural Equation Models: Tests of Significance and Descriptive Goodness-of-Fit Measures. *Methods of Psychological Research Online* 8: 23–74.

Schoenherr, Tobias. 2012. The role of environmental management in sustainable business development: A multi-country investigation. *International Journal of Production Economics* 140: 116–28. [CrossRef]

Shrivastava, Paul. 1994. Environmental technologies and competitive advantage. *Strategic Management Journal* 16: 183–200. [CrossRef]

Skinner, Wickham. 1969. Manufacturing Missing Link in Corporate Strategy. *Harvard Business Review* 47: 136–45.

The R Project for Statistical Computing. 2019. Available online: https://www.r-project.org/ (accessed on 25 May 2019).

Trujillo-Gallego, Mariana, William Sarache, and Miguel Afonso Sellitto. 2021. Identification of practices that facilitate manufacturing companies' environmental collaboration and their influence on sustainable production. *Sustainable Production and Consumption* 27: 1372–91. [CrossRef]

Tzouvanas, Panagiotis, Renatas Kizys, Ioannis Chatziantoniou, and Roza Sagitova. 2020. Environmental and financial performance in the European manufacturing sector: An analysis of extreme tail dependency. *British Accounting Review* 52: 100863. [CrossRef]

Wagner, Marcus, Nguyen Van Phu, Théophile Azomahou, and Walter Wehrmeyer. 2002. The relationship between the environmental and economic performance of firms: An analysis of the European paper industry. *Corporate Social Responsibility and Environmental Management* 9: 133–46. [CrossRef]

Walley, Noah, and Bradley Whitehead. 1994. It's not easy being green. *Harvard Business Review* 72: 46–52.

Wiengarten, Frank, Mark Pagell, and Brian Fynes. 2013. ISO 14000 certification and investments in environmental supply chain management practices: Identifying differences in motivation and adoption levels between Western European and North American companies. *Journal of Production Economics* 56: 18–28. [CrossRef]

Wieprow, Joanna Małgorzata, and Justyna Barlik. 2017. Application of discriminant models in predicting a company's risk of bankruptcy. *Central European Review of Economics and Management* 1: 121–34. [CrossRef]

Wysocki, Jacek. 2021. Innovative green initiatives in the manufacturing SME sector in Poland. *Sustainability* 13: 2386. [CrossRef]

Xie, Xuemei, Saixing Zeng, Zhipeng Zang, and Hailiang Zou. 2017. Identifying the factors determining cooperative innovation effect in emerging economies: Evidence from Chinese firms. *Chinese Managenent Studies* 11: 366–86. [CrossRef]

Yang, Chen-Lung, Shu-Ping Lin, Ya-hui Chan, and Chwen Sheu. 2010. Mediated effect of environmental management on manufacturing competitiveness: An empirical study. *International Journal of Production Economics* 123: 210–20. [CrossRef]