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## Pro-Ecological Initiatives and Profitability of Manufacturing Enterprises

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**Abstract:**

**Purpose:** The principal aim of the research was to present and evaluate the approach of manufacturing enterprises to various types of pro-ecological initiatives and to identify their impact on corporate financial performance (revenue, profit).

**Design/Methodology/Approach:** The article discusses the issue of integrating environmental initiatives into economic activities of manufacturing enterprises in Poland and tries to answer whether managers of these enterprises make environmental decisions and what impact these decisions may have on the operation of the entities they manage. Quantitative studies were carried out on a sample of 385 manufacturing enterprises pursuing a variety of economic activities in Poland (50% were small, 39% medium-sized and 11% large companies).

**Findings:** The hypothesis of the research was partially positively verified and it does not exhaust the research gap in the area. The key results from the studies indicated active (35%) and neutral (62%) attitudes of the companies surveyed to environmental issues as well as the pursuit of environmental initiatives by 77% of large, 82% medium-sized and only 39% of small enterprises. It shows that the future development of today's enterprises can be achieved in many ways, but pro-ecological initiatives should not be ignored in this process.

**Practical Implications:** On the basis of the results obtained it was found, that in most companies pro-ecological initiatives undertaken did not contribute to a net profit growth (in about 50-60% of the entities surveyed depending on the group), however, one third of the entities recorded a profit growth. At the same time, a prevailing, relatively low revenue growth (0 to 5%) due to the environmental initiatives implemented pointed to the existence of an ecological revenue gap that can be exploited by manufacturing enterprises.

**Originality/value:** The originality and value of the study are given by the fact, that it identifies specific types of pro-ecological initiatives implemented in the surveyed companies, which can serve as models to follow for other entities.

**Keywords:** Pro-ecological initiatives, sustainable development (SD), profitability, manufacturing enterprises, business management.

**JEL classification:** M1, Q01, P42.

**Paper Type:** Research article.

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## **1. Introduction**

The issue of green development of the economy is aimed at finding specific solutions that will allow companies to develop in a sustainable way, minimising at the same time a negative impact on the natural environment. It has been found that uncontrolled anthropogenic interference in the environment can seriously affect the operation of companies as well as the entire economies. In order to stop the ongoing degradation of the natural environment, numerous ecological initiatives are being taken to protect it or to reduce the manufacturing related pollution.

The pro-ecological trend, which includes these initiatives, is evident in the actions of many countries and international institutions concerned about environmental problems. It is confirmed by specific programmes and plans drawn up, for example, within the framework of the European Union environmental policy, which regulates the level of environmental pollution in the member states and encourage the use of ecological solutions in the processes of ecologisation and increased corporate competitiveness (Calanter and Ardelenu, 2011; Armeanu *et al.*, 2018; Destek *et al.*, 2018; Rozehnalová *et al.*, 2021; Magazzino *et al.*, 2021). The Action Plan for Sustainable Consumption (SCP) and Sustainable Industrial Policy (SIP), which may serve as examples, are aimed at reducing environmental pollution through rational consumption, efficient production and global action, e.g., the intention to create a global market for organic products and services (Nash, 2009; Lorz, 2009; Kielin-Maziarz, 2013).

At the same time, companies themselves are beginning to see the importance and necessity of paying more attention to the natural environment issues, and not just focusing on their own economic performance. For example, for many of them, the concept of sustainable development, which promotes the pursuit of balance between social, environmental and economic goals, inspires a change in their environmental business behaviour and pursuit of pro-ecological initiatives (European Commission, 2006). As a result, company managers are increasingly involved in pro-ecological initiatives, which is reflected in their implementation as part of their corporate development strategies.

Ecological issues are beginning to play a key role among external determinants which affect corporate operation and competitiveness (Apak and Atay 2015; Mercado-Caruso *et al.*, 2020; Alsaleh *et al.*, 2020). And this means that, in the course of its economic activity, companies cease to treat the environment solely as a source of raw materials or place of storage of waste appearing in the course and after the production process. The development of enterprises must take place in symbiosis with the environment, expressed in the rational use of raw materials and other natural resources, efficient energy consumption, use of pro-ecological technological solutions and pursuit of all initiatives to protect the environment and prevent pollution (Wysocki, 2019). And it is primarily this aspect that should change the way managers think about environmental issues, no longer only as a challenge, but also as a duty

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(Dec and Masiukiewicz, 2021a). It also means that environmental issues should be taken into account in the integrated corporate economic account, i.e., the inclusion of social and environmental effects and resignation from the classic paradigm of economic rationality.

The approach to business without environmental issues seems to be a thing of the past, so increased attention should be paid to the search for and implementation of green initiatives (Wysocki, 2016a). Thus, the aim of this article is to identify the type and scale of pro-ecological initiatives undertaken by manufacturing companies in Poland and to determine their impact on the operation and development of these entities from the perspective of turnover and profits. This has been done on the basis of results of quantitative empirical studies conducted on a random sample of manufacturing companies.

## **2. Theoretical Framework**

In the current economic environment, efficient operation and future development of manufacturing enterprises can be achieved in many ways. However, the pursuit of innovative or pro-ecological measures appears to be one of the most effective solutions. The growing significance of pro-ecological initiatives in today's economy is due to the fact that they are environmentally friendly, they do not disturb the environmental sustainability and contribute to a sustainable competitive advantage (Wysocki, 2021). Their undertaking by manufacturing enterprises also allows them to meet public expectations and to create or warm up the image of an environmental actor. It is worth indicating that pro-ecological initiatives are also increasingly found in the financial sector (Dec and Masiukiewicz, 2021b). However, if these initiatives are to become more widely disseminated and bring tangible benefits, they must be of a long-term character, based on quality and eco-innovation, being an integral part of the overall corporate development strategy.

Although the state environmental policy continues to play an important role in the implementation of pro-ecological initiatives, the legal and administrative regulations are no longer the leading motive behind their pursuit, it is now the market expectations that are increasingly performing this function (D'Souza *et al.*, 2006). In view of negative environmental impacts of manufacturing, companies must not overlook the economic side of the potential costs of environmental protection, the elimination of the effects of pollution and waste and the pressure on stakeholders to increase environmental activity. It is therefore necessary to change the attitude of companies towards the environment, which can and should contribute to improved efficiency of their operation in the long term. This can be done, for example, by optimising business processes as a consequence of conscious activities to protect the environment and reduce pollution.

In the domestic and foreign literature, there is a great deal of freedom in the use of terms describing the issue of ecological initiatives, as well as its interpretation. In the

English literature, this issue is most often referred to as green initiatives. On the other hand, in the Polish economic literature, in addition to the above-mentioned ecological initiatives, which appear to have the broadest conceptual scope, there are other terms used, for example, pro-ecological activities, environmental activities, ecological activities, green initiatives or ecologising initiatives. These terms refer to the same issue, which is more or less related to the protection of environment and/or efforts to improve its condition, which often obscures the differences between them. These terms do not refer only to specific measures to protect the natural environment, but also to new ideas, programmes, projects or ecological concepts that can be applied to manufacturing and management processes.

With regard to businesses, it can be assumed that pro-ecological initiatives are most often equated with long-term activities directly aimed at protecting the environment and eliminating environmental risks or activities aimed at improving their own development but only these that are environmentally friendly (Ster, 2000; Adamczyk, 2001; 2004; Hadryjańska, 2008; Tapia-Fonleem *et al.*, 2013; Wysocki, 2019). In this case, it should also be said that the concept of pro-ecological initiatives does not include environmental measures, but also various systemic solutions, tools, programmes, plans and concepts discussing specific environmental practices as well as environmental strategies (dilution, filtering, recirculation and prevention), thus, it covers a full conceptual spectrum of this issue (Hunt, 1990; Miles and Russell, 1997; Sharma and Vredenburg, 1998; Nash, 2009; Visser, 2010; Lim and Ting, 2011; Neugebauer, 2012; Cikankowitz and Laforest, 2013; Tetrault and Sur, 2013; Daddi *et al.*, 2014; Wysocki, 2016b; Reed *et al.*, 2021; Awan *et al.*, 2021).

Based on the presented approach to this issue, the authors worked out a self-designed list of the most common solutions found in the literature which meet ecological criteria and can be attributed to the concept of pro-ecological initiatives. The list includes such initiatives as:

- formal separation of the environmental management function in corporate management,
- official compliance with environmental principles in the framework of the concept of sustainable development,
- application of the principles of the concept of ecological corporate social responsibility (ECSR),
- application of standard environmental strategies (dilution or filtering) – consisting solely in the neutralisation of pollutants and not their elimination,
- application of preventive environmental strategies (recirculation or prevention) – preventing the appearance of pollutants at the source, in the manufacturing processes as well as reducing them,
- implementation of formal environmental management systems (according to ISO 14001 or EMAS),
- participation in the Cleaner Production Programme,
- implementation of technological eco-innovation (eco-innovation in the area of new products or production processes),

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- implementation of non-technological eco-innovation (eco-innovation in the area of new organisational or marketing solutions),
  - implementation of environmentally friendly additive technologies (end of pipe),
  - implementation of environmentally friendly integrated technologies,
  - introduction of eco-labelling on raw materials, materials, products and packaging (FSC, PEFC, Blue Angel, Ecolabel),
  - application of the IPPC Directive and the BAT Guidelines,
  - designing and offering environmentally friendly products (eco-products),
  - designing environmentally friendly solutions (eco-design),
  - striving to minimise waste in production processes,
  - re-use of waste in manufacturing processes (recycling of waste),
  - creation of “green” alliances with other entities to achieve common environmental objectives,
  - other initiatives - including the use of environmental tools and techniques to improve eco-efficiency (Checklist, MET, BSC, LCA) or other environmental indicators.

All of these initiatives were reflected in our own research, in which they were used as survey questions aimed at determining the respondents’ familiarity with them as well as the scale of application in manufacturing enterprises operating in Poland and the related profitability.

From the perspective of manufacturing enterprises, the implementation of these pro-ecological initiatives should always lead to: rational management of natural resources, use of energy-efficient and environmentally friendly technologies, lower energy consumption, reuse of post-production waste, offering environmentally safe products and stopping or consistent reduction of the negative environmental impact of production processes. Of course, it would be great if these activities could be implemented while simultaneously achieving positive economic effects and with the approval of all stakeholders.

Due to the importance of the analysed issue for both companies and the environment, the authors of the article also posed the following hypothesis, the verification of which was based on the results of an empirical study conducted.

Hypothesis: Production activities require pursuing pro-ecological initiatives, as their implementation does not only have a positive impact on the natural environment but can also improve the financial performance of enterprises.

### **3. Research Methodology**

The primary research method used to achieve the research objective was empirical research in the quantitative survey formula. This research method followed the need to reach the widest possible group of companies in the manufacturing industry in

Poland, which according to the Polish Classification of Activities (PKD) belongs to Section C, i.e., Industrial processing.

The reason for the choice of manufacturing enterprises as a research population was to indicate their impact on the natural environment due to their large size, diversity and economic potential. It should be borne in mind that the operation of manufacturing enterprises would not be possible without access to natural and environmental resources, which are critical elements of most of their production processes. In this respect, the manufacturing industry is an interesting subject of research, especially from the perspective of its negative impact on the natural environment and, consequently, the kind of pro-ecological initiatives pursued to eliminate or reduce the environmental damage.

The empirical studies presented were conducted among small, medium-sized and large manufacturing enterprises in September 2017. They were carried out on the basis of computer-aided telephone interviews (CATI), in which the main research tool was a survey questionnaire. The studies included a random stratified sample of N=385 of manufacturing enterprises, which were randomly and proportionally (within three layers) selected from the population of 14,570 active production entities in 2016. No additional criteria for the selection of companies were followed. The appropriate research was preceded by a pilot study on a sample of n=12. The companies which created the sampling frame were small, medium-sized and large manufacturing companies employing 10 to 49, 50 to 249 and more than 250 employees respectively. The distribution of enterprises for each layer in the analysed population and in the selected sample is presented in Table 1.

**Table 1.** *Distribution of research sample*

Company size	Population in 2016	Share in population (%)	Sample (N)	Share in sample (%)
Small enterprises	7 273	49.9%	192	49.9%
Medium-sized enterprises	5 665	38.9%	150	38.9%
Large enterprises	1 632	11.2%	43	11.2%
Total enterprises	14 570	100%	385	100%

**Source:** *Own elaboration.*

In the area of the companies examined, the largest group included small enterprises, followed by medium-sized, and the smallest group consisted of large companies, which reflects the distribution of the size of enterprises in the manufacturing sector and the economy as a whole. The contact and statistical data of the selected manufacturing enterprises were obtained from the Main Statistical Office in Warsaw (with the support of a research company responsible for the study technically). The study assumed a 0.95 confidence level and a 0.05 statistical estimation error.

The authors' designed survey questionnaire consisted of two main parts, the first of which included the characteristics of the research sample and the second related to the relevant research objective, namely the identification of pro-ecological initiatives

undertaken in the sector of small, medium-sized and large manufacturing enterprises in Poland. In the first part of the survey, respondents from the entities surveyed were to provide information on the kind of production activity carried out, the period of operation, the form of ownership or the annual net revenues. The second part of the survey included questions on the kind of pro-ecological initiatives implemented, the rationale for their implementation, the results of implementation or the estimation of the average annual revenues and profits resulting from the activities pursued in this regard. Due to the complexity of the issues that co-create pro-ecological initiatives, the questions in the survey questionnaire were closed and involved the possibility of selection, within the framework of a specific question, of one or more pro-ecological initiatives from among the ones mentioned in the theoretical part of the article. The questionnaire was addressed to the management staff of the manufacturing enterprises surveyed and the results were subject to the statistical and comparative analysis.

#### 4. Analysis and Results

##### 4.1 Characteristics of the Activities of the Small and Medium-Sized Enterprises Surveyed

The analysed manufacturing enterprises represented a variety of economic production activities (Section C), most of them involved in production of food (24.2 per cent), finished metal products excluding machinery and equipment (8.6 per cent), other non-metallic mineral products (7.3 per cent), chemicals and chemical products (5.7 per cent), electrical equipment (5.2 per cent), rubber and plastic products (4.9 per cent), machinery and equipment n.e.c. (4.7 per cent), textiles (4.4 per cent), computers, electronic and optical products (4.2 per cent) and clothing (4.2 per cent), i.e. companies whose activities have a negative impact on the environmental pollution. Other production activities were represented by less than 4 per cent of the sample.

The dominant form of ownership was the Polish private capital, which accounted for 81 per cent of the entities examined, the remaining 19 per cent of enterprises were mixed-capital entities. A decisive majority of the companies surveyed had been in the market for over 10 years (81 per cent), and more than half of them for more than 20 years. 21 per cent of the entities surveyed had an annual turnover of up to €10 million, more than 76 per cent of which had a turnover of up to €50 million, and only less than 3 per cent had a turnover higher than €50 million. The attitude of the surveyed companies to the environmental issue is also an interesting point. It is presented in Table 2.

**Table 2.** Attitude of the surveyed companies to environmental protection

Attitude of production companies to environmental issues	Percentage of enterprises
Active – entities show concern for the environment in their production activities and independently take pro-ecological initiatives	34.8 per cent
Indifferent - entities comply only with environmental recommendations and laws and do not show their own ecological invention	62.1 per cent

Passive - entities treat the environment as a source of natural resources and a place to dispose of waste, since business itself is the most important thing	3.1 per cent
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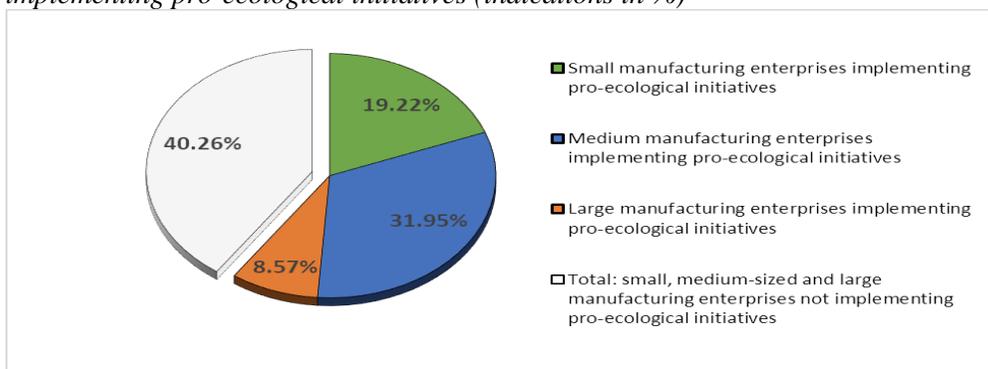
*Source: Own elaboration.*

Based on the responses, it turned out that just over 3 per cent of respondents described their attitude towards the environment as passive, 62 per cent defined their attitude towards nature as indifferent and only 35 per cent were in favour of an active attitude towards environmental protection. Although the results obtained are not the worst possible, they show quite clearly how much remains to be done in terms of promotion of pro-ecological attitudes among manufacturing enterprises operating in Poland.

#### 4.2 Results of the Survey of the Views of the Managerial Staff of Manufacturing Enterprises

The analysis of all the responses given by the managers of manufacturing enterprises in Poland showed that in the sample (N=385) almost 60 per cent of all entities pursued pro-ecological initiatives and 40 per cent did not. This group of 60 per cent of companies (N1=230) consisted of slightly over 19 per cent of small, almost 32 per cent of medium and about 9 per cent of large enterprises (Figure 1).

*Figure 1. Share of small, medium and large production enterprises in Poland implementing pro-ecological initiatives (indications in %)*



*Source: Own elaboration.*

At the same time, the examination of manufacturing enterprises with regard to the implementation or non-implementation of pro-ecological initiatives identified the population of entities (N1=230), which was subject to further analysis as to the type of pro-ecological initiatives pursued by them and the financial effects resulting from their implementation. Attention should be paid to the answers given within this population by groups of different company sizes. The real image of enterprises emerges from them; it appears that environmental initiatives are pursued by almost 77 per cent of large business entities, 82 per cent of medium-sized entities and only less than 39 per cent of small business entities. These responses seem quite appropriate to the scale and extent of the environmental involvement of the various groups of entities,

as it is the largest companies that have the strongest environmental impact. At the same time, the situation described shows that manufacturing enterprises pollute the environment and are aware of it, so they can effectively implement pro-ecological initiatives. This fact puts manufacturing companies in a quite favourable light, also in terms of combining the environmental and economic goals.

In the case of identification of specific pro-ecological initiatives carried out by the surveyed manufacturing enterprises (N1=230), it appeared that all the initiatives specified in the survey were shared by these companies. The highest number of indications for the whole surveyed population of manufacturing enterprises, i.e., above 6 per cent, went to effort to minimise waste in production processes (13.8 per cent), designing and offering environmentally friendly products (8.2 per cent), application of preventive environmental strategies (7.4 per cent), application of the ECSR principles (7.2 per cent), designing environmentally friendly solutions (7 per cent), formal separation of the environmental management function (6.9 per cent), implementation of formal environmental management systems (6.4 per cent), implementation of technological eco-innovation (6.2 per cent) and official compliance with environmental principles within the concept of sustainable development and the application of standard environmental strategies (6.1 per cent).

However, the frequency of these pro-ecological initiative indications is different in each size group (the division into large, medium and small companies). This should be considered a correct trend, as the entities due to their potential are guided by slightly different rules of operation on the market and the rationale for potential development. The most important initiatives for large companies were, effort to minimise waste in production processes (10.7 per cent), implementation of environmental management systems (9.5 per cent), and formal separation of environmental management function and application of the ECSR principles (8.9 per cent). Medium-sized entities also pointed to effort to minimise waste in production processes (13 per cent), but in the following items they indicated, designing and offering environmentally friendly products (9.1 per cent), applying the principles of ECSR (8.4 per cent) and designing environmentally friendly solutions (7.5 per cent). And small entities were clearly in favour of effort to minimise waste in production processes (19.4 per cent), designing and offering of environmentally friendly products (11.9 per cent), application of preventive environmental strategies (11.9 per cent) and designing environmentally friendly solutions (9.7 per cent).

It is worth noting that the respondents, when identifying the pro-ecological initiatives, had a wide range of possible responses and that their choice of several or more responses could indicate their considerable environmental awareness or a strong commitment to reducing negative environmental impacts. It must be borne in mind that these solutions are often pioneering or innovative in character and may sometimes be obscure to the management of manufacturing enterprises. For example, of the large entities, more than 15 per cent simultaneously carried out more than 10 pro-ecological initiatives and 85 per cent of them from 1 to 10 initiatives, which creates a rather

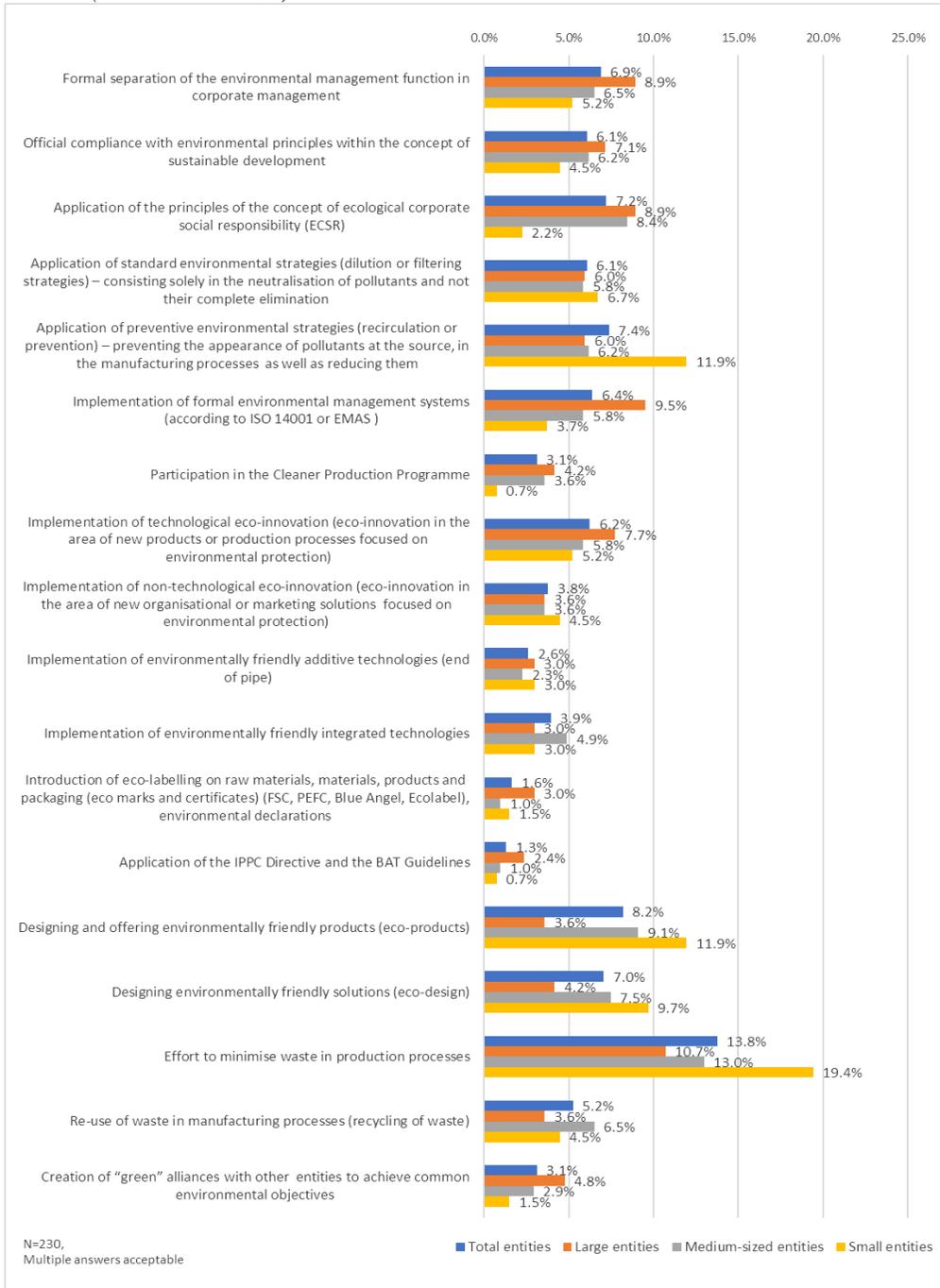
optimistic picture of these entities in terms of environmental care. At the same time, all three groups of companies must be commended for their really good knowledge of pro-ecological initiatives, as there are no pro-ecological initiatives that would not be indicated by an entity. Companies should also be encouraged to take further measures, such as the application of the IPPC Directive and BAT guidelines, eco-indications or additive and integrated technologies, which were the least frequently mentioned. Detailed information on the type and percentages of indications of pro-ecological initiatives by small, medium-sized and large manufacturing enterprises is presented in Figure 2.

However, in terms of the legitimacy of the pro-ecological initiatives and the verification of the hypothesis, the responses of the respondents from the analysed companies (N1=230) on the annual net revenues and profits that resulted from their activity in this area were crucial. Responses referring to the impact of pro-ecological initiatives on the annual revenue growth showed that more than 71 per cent of the companies surveyed saw such a dependence and this percentage should be considered to be really significant. Indeed, most of the entities confirmed that the green bias contributed to a smaller or higher revenue growth. The remaining 25 per cent of respondents replied that the implementation of pro-ecological activities did not increase their revenues and another 4 per cent did not give a clear answer.

The positive impact of initiatives on revenue was most clearly reflected in small and medium-sized enterprises, which clearly indicated the link between pro-ecological initiatives and revenue growth. In their case, this increase accounted mostly for 1-5 per cent of annual revenues compared to the period in which these activities were not pursued (the percentage of indications came up to 41.9 per cent and 38.2 per cent respectively), but also at the level of 6-10 per cent of annual revenues (the percentage of indications was 13.5 per cent and 17.1 per cent respectively). A slightly smaller percentage of indications was given by large companies, where in the range of 1-5 per cent of revenue growth, it represented 30.3 per cent and the range of 6-10 per cent was not recorded. The observed statistically significant extreme changes in revenue volumes may have resulted both from the declarativeness of the respondents' answers and from the systematic and long-term cost-benefit analysis carried out as a result of the implementation of pro-ecological activities. And the lack of indirect responses could be caused by an immediate anticipation of positive results, i.e. as soon as these initiatives have been implemented, which is rather rare in the case of investment activities.

At the same time, large manufacturing enterprises responded most to the lack of knowledge of the area (18.2 per cent). By contrast, among small and medium-sized entities, the proportion of such responses was significantly lower, 1.4 per cent and 2.4 per cent respectively. The responses given by large companies may be worrying and indicate an informal or not serious approach to environmental issues and the survey, especially as their activities tend to have the greatest impact on the environment.

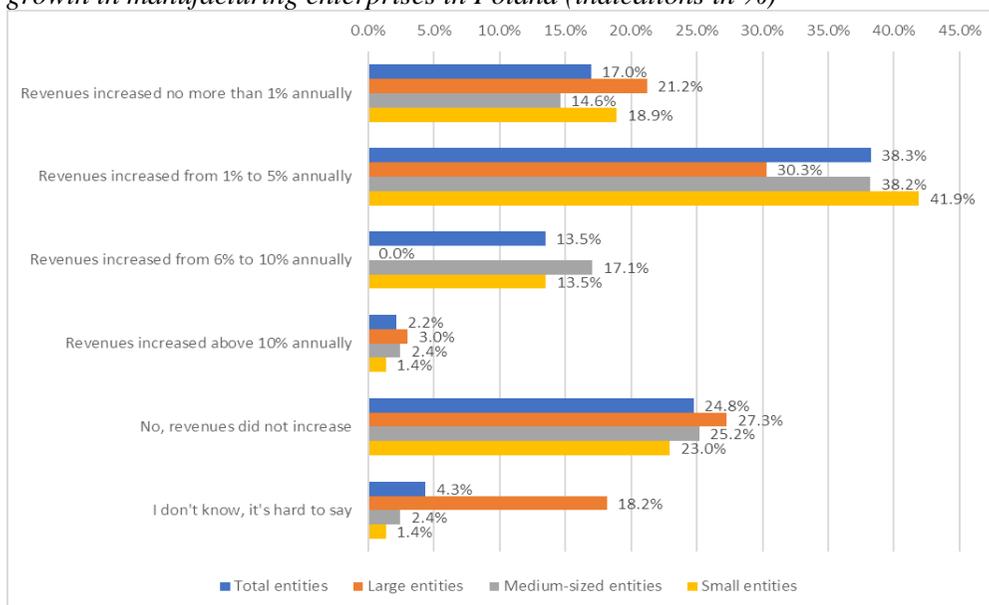
**Figure 2. Types of green initiatives implemented by manufacturing enterprises in Poland (indications in %)**



Source: Own elaboration.

In this situation, it is up to the large companies to first recognise the need for pro-ecological initiatives and to examine the environmental and financial implications of their implementation in order to be able to properly plan the future development of the organisation. Detailed information on the impact of green initiatives implemented by small, medium and large manufacturing enterprises on their revenue growth is presented in Figure 3.

**Figure 3.** Impact of implementation of pro-ecological initiatives on the revenue growth in manufacturing enterprises in Poland (indications in %)



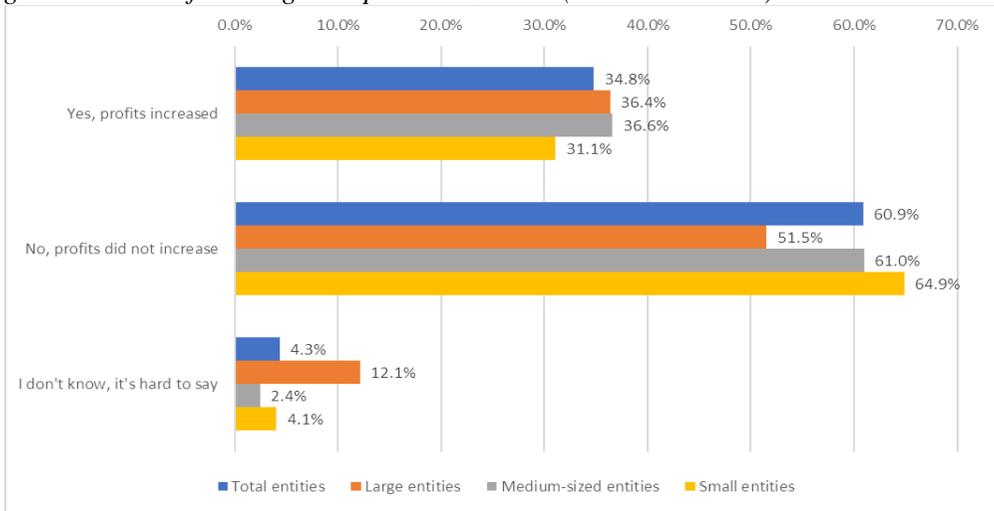
**Source:** Own elaboration.

Like revenues, net profits justify the inclusion of pro-ecological initiatives in corporate development plans. The conducted study partially verifies this statement since 35 per cent of all manufacturing enterprises surveyed thought that the pursuit of pro-ecological initiatives in the production area translates into a net profit growth. However, this is not an impressive result, especially because anyway a similar number of companies did not indicate such a dependence, no matter what the motives behind their opinions were. Although the observation of this dependence within each company size group should be welcomed both economically and environmentally, it is difficult to raise this argument as crucial in encouraging companies to become involved in pro-environmental activities.

Looking at the responses within different size groups, it should also be noted that the percentage of companies which observed a profit growth was about the same among large and medium-sized entities, and at a slightly lower level among small entities. Small businesses in particular deserve attention, as their responses show that even with significantly more limited financial capacity compared to large entities, they are

able to generate additional profits from the pro-ecological initiatives they have implemented. Detailed information showing the impact of pro-ecological initiatives on improving net profit by small, medium and large manufacturing enterprises is presented in Figure 4.

**Figure 4.** Impact of the implementation of pro-ecological initiatives on net profit growth in manufacturing enterprises in Poland (indications in %)



*Source:* Own elaboration.

To sum up the above analysis, it should be said that the percentage of manufacturing enterprises which confirmed a profit growth resulting from the implementation of pro-ecological initiatives appeared almost 50 per cent lower than the percentage of entities which declared a revenue growth. This situation illustrates a certain convergence in the answers given, the opposite would mean its denial, and can therefore be considered credible. It can also be concluded with full conviction that undertaking pro-ecological initiatives does not necessarily hinder the achievement of such economic objectives as revenue or profit growth.

## 5. Discussion

Empirical studies carried out on a group of manufacturing enterprises operating in Poland confirmed significant environmental activities of these entities and their conscious pursuit of various pro-ecological initiatives. In this context, it is impossible to ignore an important role of managers and their conscious decisions in this area (Dec and Masiukiewicz, 2021a; Sulich *et al.*, 2021, Spoz, 2021). The surveyed companies were able to list both the types and numbers of pro-ecological initiatives undertaken by them and determine their impact on the net revenue and profit. It was also important that the analysed companies conducted pro-ecological initiatives, understanding not only the legitimacy of their implementation in the area of current environmental threats, but also seeing the environmental benefits (e.g., reduced pollution) and

economic benefits (e.g., revenue and profit growth). Ultimately, as indicated in the literature, the public perception of corporate environmental activities plays a very important role, because without the environmental awareness of consumers, the undertaken initiatives do not have to be effective eventually (Rodríguez-García *et al.*, 2019; Wierzbiński *et al.*, 2021). Similarly, initiatives aimed at staff environmental education are important factors throughout the process of production, so the motivation of companies in this area is most desirable (Safari *et al.*, 2018; Uddin, 2021).

The responses given from the perspective of financial data can also be considered forward-looking, as they show that pro-ecological initiatives do not have to be in conflict with business aspirations. Although it is difficult to state that the implementation of pro-ecological initiatives unconditionally contributes to net revenue and profit growth, it is possible to risk a statement that this phenomenon does occur and to extrapolate it to the whole population of manufacturing enterprises. It is worth mentioning, though, that it is much easier to take sustainable development measures for the third sector entities and organisations, often not necessarily profit-oriented (Hinton, 2020). It does not exclude the possibility of co-existence of pro-ecological decisions and planning company efficiency and profits (Radzevicius, 2018; Loon, Wassenhove 2020). This approach allows for at least a partial positive verification of the hypothesis posed by the authors, although it does not exhaust the research gap in the area.

Therefore, in the face of ecological crisis, all theoretical considerations of pro-ecological initiatives pursued by manufacturing enterprises should be continued as they can allow company managers to achieve economic and environmental objectives simultaneously. All the more so since the discussion on further economic changes in the ecology and sustainable development is not over and new ideas and new solutions are being proposed (Akbulut and Adaman, 2020).

In summary, it is true to say that the future development of today's enterprises can be achieved in many ways, but due to environmental considerations, pro-ecological initiatives should not be ignored. Unfortunately, the problem of weak involvement in green initiatives is still quite common among Polish manufacturing enterprises, most of which differ in terms of environmental levels from companies in highly developed countries. Therefore, the best solution is to precisely apply pro-ecological initiatives, which in the manufacturing industry have a special impact on saving resources and reducing pollution (Yurdakul and Kazan, 2020). A fairly old statement remains topical: it is not possible to manage companies without protecting the environment, and concern for its condition should become a programmed activity and permeate all spheres of activity of the organisation (Penc, 1999).

Bearing in mind that a passive environmental attitude of manufacturing enterprises will limit their level of competitiveness, it is worth not only implementing green initiatives, but also including them in the development strategy, which can become a

kind of safeguard for their due and adequate conduct. Even more so because pro-ecological initiatives often have to be juxtaposed not only with new challenges (explosion of digitisation), unexpected events (black swans – Covid-19 pandemic), but also with continuously great pressure of various stakeholders and company owners, who already have considerable knowledge of the importance of sustainable development (Sari *et al.*, 2020).

## 6. Conclusions

The conducted studies explicitly demonstrate the need to implement pro-ecological initiatives in manufacturing enterprises, where there is still a large space for such activities. The ongoing digital transformation and the almost omnipresent need for pro-ecological activities, including pro-climate measures, poses two challenges for manufacturing enterprises. The first relates to keeping up with technological and IT developments, and the second challenge involves developing production processes which take into account sustainable development principles or successively implemented regulations that oblige companies to pursue activities to protect the environment.

However, manufacturing companies, unlike service or financial companies, need more detailed rules on the compliance with environmental requirements as well as realistic schedules of implementation of such changes. This also gives rise to the need for further analyses and studies in the research area indicating the directions of reconfiguration of the existing production processes so that they are as close as possible to the existing environmental agendas.

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