Green Innovation in Small and Medium-Sized Enterprises

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Abstract

Environmental protection is a priority for all countries. Ways are being sought to reduce the harmful effects of the population and to improve the environmental friendliness of business. In Bulgaria, small and medium-sized enterprises (SMEs), which have the largest share in the economy, have a significant contribution to environmental pollution. In view of this, timely measures to overcome this situation could lead to serious positive results. Green innovations are the main mechanism for achieving environmentally friendly economic growth and their importance is constantly growing.

This article presents the results of an empirical study of the innovation activity of Bulgarian SMEs in the field of green innovation. The study also identified the attitudes of SME managers to this type of innovation. These results could be the basis for further discussion on these issues and be useful not only for future research, but also for all institutions responsible for stimulating innovation and development of SMEs in our country. Received: 18.03.2022 Available online: 31.12.2024

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Introduction

Along with the widespread use of the concept of sustainable development, there has been increasing talk of green innovation. The term "green innovation" is closely related to the terms green growth, green business, green production, environmental friendliness and others. Moreover, it is accepted that green innovations are the main tool for their implementation in practice. They are often used interchangeably with the term "eco-innovation". At the same time, however, there is still no consensus on the nature, content and varieties of green innovation at company level.

There are different definitions of green innovation in the specialized literature. As stated in (Velev M., Takov B, Veleva S., 2017) some authors define them as "innovations in products, processes or the business model that lead to a higher degree of environmental sustainability of the company." This is achieved by minimizing the impact on the environment (Nunes B., Bennett D., Shaw D., 2013). The definition in the Oslo Manual is similar, namely that green innovations are "the introduction of a new or significantly improved product

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(material product or service) or process, a new marketing method, a new organizational method in business that generates higher benefits for the environment compared to the current situation (OECD and Eurostat (2005), Oslo Manual).

The EU Eco-Innovation Action Plan defines eco-innovation as "any type of innovation that results from or aims at significant and visible progress towards sustainable growth, by reducing the harmful effects on the environment, enhancing the sustainability of environmental impacts or achieving more efficient and responsible use of natural resources" (European Commission, 2019).

In our opinion, the opinion of the authors is more justified, who connect green innovations with the introduction of innovations in the organization, which both improve its environmental friendliness and its economic results. For example, according to the OECD, green (environmental) innovations are all innovations that have a beneficial effect on the environment, whether or not this effect has been the main objective of the innovation (OECD and Eurostat (OECD and Eurostat (1997), Oslo Manual). They should not be seen simply as a cure for environmental problems, but also as an activator for the economy and strengthening the competitiveness of the regions on the international market (European Commission, Directorate-General for Regional and Urban Policy REGIO.DGA2.G1, 2012).

Opinions on the nature of green innovation at the company level also vary. With some degree of conditionality, they can be grouped into several main groups. In the first group are the opinions that link green company innovations only with the introduction of green processes, i.e. with the introduction of clean technologies - those that improve the environmental friendliness of production processes. This is Ziegler's view that they are a special kind of process innovation that should eliminate or reduce environmental damage (Ziegler, A., Nogareda, J. S., 2009; Ziegler, A., Rennings, K., 2004).

The second group of opinions connects green company innovations only with the introduction of a green, ecological result, i.e. environmental products or services (Chen Y, 2011). The third group of opinions combines the previous two and links green innovation both with the introduction of clean technologies and with the creation of a clean result (BI, K., BAO, Q., FENG D., 2013; B. Kexin, Y. Chaojun, H, Ping, 2011, etc.).

The fourth group of opinions dominates in the specialized literature and according to the authors it is the best substantiated. It links green corporate innovation to the introduction of processes that have a beneficial effect on the environment, whether or not this effect has been the main goal of the innovation. In other words, they take into account the possibility of achieving a positive economic and market result, and in different cases, these innovations can be aimed at improving the economic performance of the enterprise, but at the same time its environmental friendliness. In each case, they may be related either to the introduction of cleaner processes, or to those that create a green result, or both. Such is, for example, the OECD opinion set out in the Oslo Manual (OECD and Eurostat (1997), Oslo Manual). The opinions of many other authors are similar (Santamaria, S., Nieto, MJ, Miles, I., 2012; Brunnermeier, SB, Cohen, MA, 2003; Glavic, P., Lukman, R. (2007). And etc.).

The analysis of the different opinions gives us grounds here to accept the following definition of green corporate innovations, namely: Green company innovations are all innovations in the organization, which lead to

an increase in its environmental friendliness. They are such regardless of whether they are aimed only at solving some of its environmental problems or are for other economic purposes, but through their implementation is achieved and environment friendliness is increased. (Velev M., Takov B, Veleva S., 2017).

Various classifications of the types of green company innovations are offered in the specialized literature. They are usually reduced to two main types - green product and green process innovations (Conding J., Zubir A., Hashim S., Lanang N., A 2012). Other authors believe that in addition to product and process innovations, organizational innovations should also be included in the composition of green innovations (Bernauer T., Engel St .., Nogareda J., 2007). A significant number of authors adhere to the opinion of the Oslo Manual (OECD and Eurostat (2005), Oslo Manual) that green innovations include product, process, organizational and marketing innovations (Galia F., Ingham M., Pekovic S., 2013).

Scientific developments dedicated to green innovations are becoming increasingly important. Numerous empirical studies are being performed. However, a number of important aspects remain unresolved or insufficiently well researched and developed. The problems of SMEs in implementing green innovations are insufficiently studied (Takov B., Velev M.,2021).

Given this, the purpose of this article is to present the results of a study of the green innovation activity of Bulgarian SMEs. The study also identified the attitudes of SME managers to this type of innovation. These results could be the basis for discussion on these issues and be useful not only for future research, but also for all institutions Green Innovation in Small and Medium-Sized Enterprises

responsible for stimulating the innovation of SMEs (Takov B., Velev M., 2021).

Methodology

The present study is part of a larger research of the innovation activity of small and medium-sized enterprises in Bulgaria and for this reason to a large extent used the methodological bases indicated in (Takov B., Velev M., 2021). The study was conducted in 2019 and covers 100 enterprises, of which 70% are micro-enterprises, 20% small and 10% medium-sized enterprises. The approach is based on the collection, processing and analysis of empirical information on the basis of specially prepared questionnaires sent by mail and e-mail.

The following goals are set:

- To clarify the importance that the managers of Bulgarian SMEs attach to green innovations for achieving environmental friendliness and economic success;
- To study the activity of Bulgarian SMEs for green innovations, including by types;
- 3. To study the levels of novelty of the introduced green innovations;

The following main research hypotheses were formulated:

- Most of the managers of Bulgarian SMEs do not fully assess the importance of green innovations;
- The green innovations activity of SMEs is not high and it is lower in the smaller enterprises;
- 3. The level of novelty of the introduced green innovations in SMEs is not high.

Main results

The survey showed that the managers of Bulgarian SMEs do not attach enough importance to green innovations to achieve



Fig. 1. Relative share of respondents, according to the importance attached to green innovations.

Table	 Distribution 	n of th	ne respondents'	assessments of	of th	e importance o	f green	innovations
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Indicated scores	% of respondents
1. they do not have any importance	3 %
2. they have low importance	12 %
3. they are rather of low importance	19 %
4. they have a neutral importance	14 %
5. they have a rather high significance	22 %
6. they are of high importance	10 %
7. they are of very high importance	5 %
No opinion	15 %

success of enterprises. Only 37% of the respondents indicated that they are important (Fig. 1, Table 1). However, only 5% indicated that they were of very high importance, 10% that they were of high importance, 22% that they were of rather high importance, 15% have no opinion.

The largest share is of the surveyed representatives of micro-enterprises, which clearly underestimate green innovations –

55,72%, and 20% did not give an answer. The highest marks for the importance of green innovations were given by the representatives of medium-sized enterprises - 40% of their respondents indicated 7 - very high importance, and the remaining 30% - 6 - high importance and 10% - 5 - rather high value only 10% of them that have a neutral value - rating 4. The distribution of estimates by size of the enterprise are shown in Table 2.

Indicated scores	% of respondents from micro- enterprises	% of respondents from small enterprises	% of respondents from medium-sized enterprises
1. they do not have any importance	4,29 %	-	-
2. they have low importance	15,71 %	%	-
3. they are rather of low importance	22,86 %		-
4. they have a neutral importance	12,86 %	20 %	
5. they have a rather high significance	18,57 %	40 %	
6. they are of high importance	5,71 %	15 %	
7. they are of very high importance		-	50 %
No opinion	20 %	%	-

Table 2. Distribution of the respondents' assessments of the importance of green innovations by size of SMEs



Fig. 2. Share of SMEs that have implemented green innovations.

The results of the study prove the first working hypothesis, namely that a large part of the managers of Bulgarian SMEs underestimate the importance of green innovations.

The underestimated importance of green innovations has also affected the activity of SMEs in this direction. The study showed that only 24% of them have implemented such

innovations, defined as innovations that lead to increased environmental friendliness of the organization, regardless of their goals (Fig. 2). Green process innovations were implemented by 14 enterprises, green product innovations 5, green organizational 3 and green marketing only 2 enterprises. The shares of the individual types of implemented green innovations by SMEs are shown in Fig. 3.





Fig. 3. Implemented green innovations by types.



Fig. 4. Shares of SMEs by size that have implemented green innovations

Micro-enterprises again have the lowest activity for green innovation. The share of these enterprises that have carried out such innovations is only 15.71% (11 microenterprises) of their total number. The share of small enterprises is - 8 (40%), and of medium enterprises - 5 (50%). This distribution is shown in FIG. 4. These results clearly show the relationship between the size of the enterprise and the innovation activity for green innovation.

enterprises) of their total number. The share of small enterprises is - 8 (40%), and of medium enterprises - 5 (50%). This (Takov B., Velev M., 2021). The average size

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Tuno of groop	Microenterp	orises	Small busin	esses	Medium-sized enterprises		
innovation	Number of %		Number of enterprises	%	Number of enterprises	%	
Green process innovations	7	10,0 %	4	19,05 %	3	30,0 %	
Green product innovations	3	4,29 %	1	5,0 %	1	10 %	
Green organizational innovations	1	1,43 %	2	10,0 %	-	-	
Green marketing innovations	-	-	1	5,0 %	1	10,0 %	

Table 3. SMEs that have implemented green innovations



Figure 5. Number of implemented green innovations by type.

of enterprises that have implemented green process innovations are 3 (30.0%)%, 1 (10.0%) has implemented green product innovation, and 1 (10.0%) green marketing innovation. In the case of micro-enterprises, these units are respectively - 7 (10.0%) implemented green process innovations, 3 (4.29%) implemented green product innovations, 1 enterprise (1.43%) implemented green organizational innovation and none has not made a green marketing innovation.

As already mentioned, it has been found that some SMEs have made more than

one green innovation. The number of such innovations carried out during the period under review in the surveyed enterprises is 32. The implemented green process innovations are 18, green product innovations 7, green organizational 5 and green marketing innovations only 2. The shares of individual types of green innovations by SMEs are shown in Fig.5.

The number of green innovations carried out on average per enterprise in the sample is 0.32, and the average per enterprise from those that carried out such innovations



Fig. 6. Number of green innovations by type, on average per SME of enterprises that have carried out such innovations.

	Microen	terprises	Small bu	sinesses	Medium-sized enterprises		
Type of green innovation	Number of innovations	Number of innovations On average per 1 enterprise		On average per 1 enterprise	Number of innovations	On average per 1 enterprise	
Green process innovations	8	1,14	5	1,25	5	1,67	
Green product innovations	3	1,0	2	2,0	2	2,0	
Green organizational innovations	2	2,0	3	1,5	-	-	
Green marketing innovations	-	-	1	1,0	1	1,0	

Table 4. Number of implemented green innovations in SMEs of different size

is 1.33. The number of green process innovations carried out on average at one of the enterprises that carried them out was 1.29, of green product innovations 1.4, of green organizational innovations 1.67 and of green marketing innovations 1 (Fig. 5).

The distribution of the implemented types of innovations by SMEs of different size is shown in Table 4.

Medium-sized enterprises have implemented a larger number of green innovations of all types per enterprise on average than smaller ones. The results presented so far give grounds to conclude that the activity of SMEs of all sizes for green innovation is low, as it is lower for smaller enterprises. This result confirms the second research hypothesis.

Regarding the degree of novelty of green innovations, the respondents indicated that::

8 of the implemented green process innovations are new for the Bulgarian conditions and 10 are new only for the enterprise;

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Table 5. Number of implemented green innovations by degrees of novelty in SMEs of different size

	Microen	terprises	Small bu	sinesses	Medium-sized enterprises		
Type of green innovation	New for the company	New for the country	New for the company	New for the country	New for the company	New for the country	
Green process innovations	6	2	2	3	2	3	
Green product innovations	3	-	1	1	-	2	
Green organizational innovations	2	-	2	1	-	-	
Green marketing innovations	-	-	1	-	1	-	

Table 6. Level of novelty of the green innovations in SMEs (total)

Type of green innovation	Average level of novelty
Green process innovations	4,67
Green product innovations	4,29
Green organizational innovations	4,4
Green marketing innovations	4,1
TOTAL:	4,62



Fig. 7. Level of novelty of the implemented green innovations

Table 7.	Average	level of	novelty	and	signifi	cance	of	the	implemen	ted	green
		innova	ations ir	ו SM	IEs of	differe	nt s	size			

Type of green innovation	Microenterprises	Small businesses	Medium-sized enterprises
Green process innovations	4,25	4,8	5,2
Green product innovations	3,8	4,5	4,8
Green organizational innovations	3,5	5,0	-
Green marketing innovations	-	4,0	4,2
TOTAL:	4,03	4,73	4,98



Fig. 8. Level of novelty of the implemented green innovations in SMEs of different size

- 3 green product innovations are new for the Bulgarian conditions and 4 are new only for the enterprise;
- 1 green organizational innovation is new for the Bulgarian conditions and 4 are new only for the enterprise;
- and the 2 implemented green marketing innovations are new only for the enterprise;

Table 6 shows that 84.62% of the implemented green innovations by microenterprises were new only for the enterprise itself and only 15.38% are new for the country. Moreover, only 2 green process innovations are new for the country and none of them is product or organizational. The situation is slightly better for larger enterprises. The indicated percentages for medium-sized enterprises, are - 37.5% new only for the enterprise itself and 62.5% - new for the country. These results show the dependence of the novelty of green innovations on the size of SMEs.

The average level of novelty and significance for the change of green innovations carried out in enterprises was

also assessed on a 7 - point scale, in which a score of 1 shows a very low level and 7 - a very high level. According to the interviewed SME leaders, green innovation did not have a high level, assessed as a degree of novelty and significance of the change. It is logical to expect that this has affected the environmental and economic results of their implementation. The information summarized for all surveyed enterprises is shown in Table 6

The average level of novelty and significance for the change of the green process innovations carried out in the enterprises is relatively higher - 4.67. Their level of novelty is higher in all three groups of enterprises according to their size. It is obvious that they have invested mainly in the renovation of their production base. In the second place are green organizational innovations, in which with relatively less money you can achieve a good result (Fig.7).

It is noticed that the degrees of novelty of green innovations increase with the size of enterprises. Medium-sized enterprises perform best in all their innovations (Table 7 and Fig.8).

This result confirms the third research hypothesis.

Conclusion.

SMEs make up approximately 99.8% of the enterprises in our country (Takov B., Velev M., 2021), which determines their great importance, but also responsibility in the efforts for environmental protection. Unfortunately. the results of research presented here give grounds to conclude that they do not cope well with this problem. A significant part of their managers still do not fully appreciate the importance of green innovations as a means to achieve higher environmental and economic results. This FOR ERDF MANAGING AUTHORITIES, 2012

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is one of the reasons for the low green innovations' activity of enterprises, which is even insignificant in the smallest enterprises. In addition, in general, the introduced green innovations were characterized by a relatively low level of novelty and a degree of positive impact. It is clear that the development and implementation of state policies is needed to stimulate the overall development of SMEs and innovations in them. New research is also needed to set the right direction for these policies.

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