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FACTORS AFFECTING THE USE OF TAX PREFERENCES FOR RESEARCH AND DEVELOPMENT IN POLAND¹

Summary

Purpose – The objective of the article is to identify the factors affecting the use of R&D tax preferences in Poland.

Research method – Qualitative and quantitative analysis, synthesis, deduction, induction, and inference by analogy. The study involved a group of 350 enterprises from the Lower Silesia Province in the high and medium-high technology sector and used the CATI survey methodology. The collected data was subjected to statistical analysis, including correlation and significance analysis.

Results – The study investigates the reasons for not using tax preferences, the barriers to their use, and proposals of respondents (companies surveyed) regarding changes to the tax preferences. The main factors identified include appropriate organisation of R&D in the enterprise, cooperation with research entities, and knowledge of fiscal instruments supporting the development of R&D.

Originality/value/implications/recommendations – Tax preferences (R&D tax relief and IP Box) are not used on a large scale and entrepreneurs say they have difficulty with using them. This study confirms that there are certain factors affecting the implementation of R&D and the use of tax preferences. So far, no attempt has been made to link the reasons for not using tax preferences, the barriers to their use, and the entrepreneurs’

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proposals for changes so as to clearly identify the key factors affecting the use of effective legal solutions.

Keywords: research and development, factors affecting the use of tax preferences, R&D relief, IP Box

JEL classification: O31, O32, K34

1. Introduction

Globalisation and high competition on the economic market require entrepreneurs from various sectors to look for innovations varying in size and scope. Innovation processes are always based on research and development as this is what determines whether a project is innovative or not. Innovative enterprises create innovative economies. In Poland, the Strategy for Responsible Development [*Strategy*, 2017] was developed. One of its objectives is to increase the innovation of enterprises in the domestic and foreign markets. In this regard, two main tax instruments have been proposed to entrepreneurs: R&D tax relief and IP Box. The former was introduced in 2016 and the latter in 2019. As studies show [www 1], their use is still at an unsatisfactory level, which may affect the R&D spending rate. Why is this the case? What are the reasons behind this? What are the effective solutions to change the current situation?

The aim of this study is to identify the factors affecting the use of R&D tax preferences. It identifies barriers hindering or preventing the application of legal solutions supporting R&D, indicates the reasons for not using them, and recognises the areas of change as indicated by Polish enterprises from the high and medium-high technology sector. The research is based on the questionnaire developed and validated during the first phase of the study. The reasons for not using tax preferences were initially identified in the pilot study and then verified in the main study. As the final outcome of the research process (the final phase), a set of recommendations for legal solutions in the field of tax preferences will be presented so as to encourage greater use of R&D entities by Polish enterprises. The research thesis is as follows: „There are factors that significantly affect the implementation of R&D and the use of tax preferences.”

The assessment was performed using statistical analysis on a sample of 350 entities from the Lower Silesia Province representing innovative industries (including high and medium-high technology sector). The following research methods were used:

- statistical analysis, including correlation and significance analysis (CATI survey methodology);
- synthesis (causal association);
- induction and deduction (scientific approach; formulation of axioms, paradigms, and postulates; comparison; statistical reasoning);
- inference by analogy (reasoning by similarity).

Based on the analysis of the results, factors that have a significant impact on the use of tax preferences for R&D by entrepreneurs were identified. The study is required to develop the recommendations for changes in regulations (including legal and organisational changes) and good practices for entrepreneurs to encourage greater use of tax preferences. The study fills a research gap as tax preferences supporting R&D have not been fully identified to date.

Business innovation is a field of study already investigated in the previous century. J.A. Schumpeter [1912] who developed the model of the emergence of innovation is considered a forerunner in this field. Since then, innovations introduced by enterprises have been repeatedly defined and classified, with the emphasis on their character, type, phases of implementation, risks associated with conducting them, and the manner of management [Rogers, 1995; Schumpeter, 1985; Tidd, Bessant, 2021; Bogdanienko, 1998; Drucker, 1985; Unger, Zagler, 2000; Rothwell R, Gardiner, 1985; Bal-Woźniak, 2012; Trott, 2002; Ratajczak, 1995; Zajączkowski, 2003; Kordos, 2020]. All reports emphasise that the research and development process in the project is the key to the emergence of innovation. Indeed, there is no innovation without research and development. Hence, the theory and practice of management science, economics, and finance define these categories [*Uor, IAS/IFRS, Handbook*, 2018]. All of them emphasise the innovative approach of R&D, both in research and development works. The former stands out with the unpredictability of the final effects of the activities and the latter – with the possibility of identifying the final effects [SJP, Encyclopaedia]. In economic practice, it is often difficult to identify when the transition from the research phase to the development phase takes place, which is why the activities are jointly called research and development (R&D). For the purposes of this study, R&D is defined as the improvement and development of existing products, services, and processes, including the creation, design of new, changed, or improved products, services, and processes, as well as the development of prototype systems and pilot projects [Nita et al., 2022].

Due to the usually high risk of conducting R&D and the high expenditures needed for the implementation of tasks in particular phases of the project, enterprises need a working environment that is conducive to them. To address this, there

are many works devoted to the situation of enterprises conducting innovative activities in Poland [Włodarczyk, 2007; Strychalska-Radzewicz, 2011; Ober, 2022], the constraints and difficulties indicated by enterprises, and the fiscal tools that can be applied in this regard [Romanowska, 2016; Oksanych, 2019; Grego-Planer, Kuś, 2020; Małecka-Ziemińska, Łukaszewska, 2021; Szuper, 2021; Guimaraes, Tortorella, 2022]. The success of an enterprise depends on a number of factors, including legislative support, which falls within the objectives of the Strategy for Responsible Development [*Strategy*, 2017]. Changes to legislation are intended to remove barriers to innovative activity on the one hand and to stimulate innovation processes through appropriate fiscal incentives and changes to procedures for commercialisation of research results on the other. The possibility of using tax preferences in the form of the so-called research and development relief (“R&D relief”)² and IP Box preference (“IP Box”)³ is one of the tools implemented.

It should be emphasised that the available reports are not sufficient as they refer to studies conducted in earlier years [KPMG, 2016] or assessments made only in terms of identifying barriers to the implementation of R&D [Kasprzak, 2018; *Ayiming Report*, 2019]. To develop effective solutions, on the other hand, it is necessary to identify the barriers hindering the use of tax preferences, the reasons for not using them, and the needs, expectations, and proposals for change indicated by companies. So far, no attempt has been made to link the reasons for not using tax preferences, the barriers to their use, and the entrepreneurs’ proposals for changes so as to clearly identify the key factors affecting the use of effective legal solutions. This study fills the research gap in this respect.

3. Research assumptions

To achieve the research objective, the data were collected by means of a questionnaire. The questionnaire was developed and validated in the first phase of the research process. To ensure data representativeness, the population of the surveyed entities was defined in the first step. The survey covered enterprises from the Lower Silesia Province, representing manufacturing and service activities in the

² R&D relief is a tax preference based on the so-called cost side. Thanks to this solution, eligible costs that have been incurred for research and development activities can be deducted from income.

³ IP Box is a preferential taxation of income derived from the sale of products or services produced on the basis of intellectual property rights.

field of high and medium-high technology sector. This includes entities which, by definition, should carry out research and development. The choice of the Lower Silesia Province results from the assumption that it is one of the most innovative regions. The value of internal expenditure on R&D per inhabitant [*GUS Statistics Poland data for 2020*] is PLN 870.10 and ranks 4th after the Mazowieckie Province, the Małopolskie Province, and the Pomorskie Province. The population size was determined on the basis of GUS data. Details are shown in Table 1.

TABLE 1

Data to determine the population

| Enterprise size* | Number of entities | Percentage |
|------------------|--------------------|----------------|
| Micro | 20 380 | 97.34% |
| Small | 347 | 1.66% |
| Medium-sized | 145 | 0.69% |
| Large | 64 | 0.31% |
| Total | 20 936 | 100.00% |

* For the purposes of the study, the following definitions of the size of the enterprise were adopted: micro (up to 9 FTEs and/or balance sheet total/annual turnover up to EUR 2 million); small (up to 49 FTEs and/or balance sheet total/annual turnover up to EUR 10 million); medium (up to 249 FTEs and/or balance sheet total/annual turnover up to EUR 50 million); large (over 250 FTEs and/or balance sheet total/annual turnover over EUR 50 million).

Source: authors' own elaboration based on GUS data – national business entities registered in REGON (National Official Business Register) declaring business activity by expected number of employees, provinces, and PKD (*Polish Classification of Activity 2007* as of 31 December 2021).

The population size was used to determine the sample size according to the following formula [Jabłońska, Sobieraj, 2013] (Formula 1):

$$N_{min} = \frac{N}{1 + \frac{4d^2(N-1)}{z^2}} \quad (1)$$

where:

N – the size of the general population

z – standard value from the standard normal tables for a given level of significance

d – maximum error of estimation

The following criteria were assumed in the study: confidence level 95%; fraction size 0.5; and maximum error. Based on these criteria, a minimum sample size was determined (350 entities). Details of the sample surveyed are presented in Table 2.

TABLE 2

Sample size by declared number of employees

| Size of the enterprise | Number of entities | Percentage |
|------------------------|--------------------|----------------|
| Micro | 309 | 88.29% |
| Small | 24 | 6.86% |
| Medium-sized | 13 | 3.71% |
| Large | 4 | 1.14% |
| Total | 20 936 | 100.00% |

Source: authors' own elaboration.

The questionnaire consisted of 21 questions on research and development, the use of tax preferences, and the evaluation of cooperation between enterprises and scientific institutions. The questions were developed on the basis of the literature review and available reports on the subject. The research tool was tested in a pilot study on a sample of 100 IT companies from the Lower Silesia Province. The results of the test have been presented by Nita et al. [2022].

The main study was anonymous. The survey included a scale intended to help specify the size of the enterprise (based on employment, balance sheet total, and annual turnover), the age of the enterprise, and the industry. The data derived from the scale analysis show that due to the low size of enterprises other than micro-enterprises, this group was more widely represented in the survey than the one found in the population. However, the discrepancies are not large and the survey can be considered representative. In the period from June to August 2022, in-depth interviews based on the CATI methodology were conducted. They included telephone interviews with representatives of entrepreneurs (mainly financial directors, board members/owners, and accountants).

The next section presents the results of the survey for entities claiming to be involved in research and development. The aim of the survey was to identify factors affecting the use of tax preferences, on the basis of the barriers diagnosed, and the reasons for not using them. Out of 350 entities, 86 are involved in R&D. Detailed data is presented in Table 3.

TABLE 3

Enterprises that carry out R&D activities by declared enterprise size

| Size of the enterprise | Number of entities | Percentage | Percentage in the sample |
|------------------------|--------------------|-------------|--------------------------|
| Small | 69 | 80.23% | 22.33% (69/309) |
| Medium-sized | 8 | 9.30% | 33.33% (8/24) |
| Large | 6 | 6.98% | 46.15% (6/13) |
| Large | 3 | 3.49% | 75.00% (3/4) |
| Total | 86 | 100% | - |

Source: authors' own elaboration.

First, the results on barriers to the use of tax preferences and reasons for not using tax instruments were analysed. In this respect, the factors influencing the barriers and reasons were examined and the factors affecting the use of tax preferences by entrepreneurs were identified.

Statistical methods used include the chi-square test and the Fisher's exact test. To analyse the relationship between two nominal variables, the chi-square test was performed. For questions where the assumption of expected sizes might not be met [Słowińska, 2019] and for 2x2 arrays, the Fisher's exact test was performed [Kończak, Chmielińska, 2013]. The hypotheses were the same for both cases:

H_0 : The variables used in the study are independent.

H_1 : The variables used in the study are dependent.

The decision as to reject or accept the null hypothesis was based on p -value. The assumed significance level was $= 0.05$. If the calculated p -value was lower than the set threshold, the null hypothesis was rejected (the variables are not independent). In all other cases, there were no grounds to reject it (H_0 accepted).

4. Results

The aim of the study was to identify the existing barriers to the use of tax instruments to support R&D and the reasons for not using them. As many as 21 entities out of 86 surveyed used at least one tax preference in one of the years

covered by the study (2016–2021). The detailed distribution of responses to the question on the use of tax preferences is presented in Table 4.

TABLE 4

Responses regarding the use of tax preferences

| Size of the enterprise | YES | Percentage of the population | We have not started to use them yet, but we intend to do so | NO | We are trying to get involved | IP Box | | | R&D relief | | | | | |
|------------------------|-----------|------------------------------|---|-----------|-------------------------------|----------|----------|-----------|------------|----------|----------|----------|----------|-----------|
| | | | | | | 2019 | 2020 | 2021 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
| Micro | 14 | 20.28% | 12 | 36 | 7 | 4 | 7 | 10 | 1 | 2 | 3 | 4 | 5 | 6 |
| Small | 3 | 37.50% | 1 | 3 | 1 | 2 | 2 | 3 | 0 | 1 | 1 | 1 | 1 | 2 |
| Medium-sized | 3 | 50.00% | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 3 |
| Large | 1 | 33.33% | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Total | 21 | - | 14 | 42 | 9 | 6 | 9 | 13 | 2 | 4 | 6 | 8 | 9 | 12 |

Source: authors' own elaboration.

To identify the barriers to the use of tax preferences, respondents were asked what the biggest problems their company had to face when using tax preferences in the form of R&D relief. The respondents could choose a maximum of 2 answers out of the 10 indicated. Detailed results are presented in Table 5.

The main barriers (most frequently mentioned) include R&D documentation (for both tax instruments), the preparation of working time records and the separation of eligible costs in accordance with tax laws (for R&D relief), as well as the calculation of the nexus index and the separation of income relating to intellectual property rights (for IP Box). R&D identification, the records of eligible costs in accordance with the Accounting Act, and the acquisition of qualified intellectual property rights were not considered a barrier. It can be concluded that entrepreneurs do not identify barriers with basic criteria entitling them to tax preferences.

TABLE 5

Responses regarding barriers to the use of tax preferences

| Tax instrument | Barrier | Micro | Small | Medium-sized | Large | Total | Percentage |
|----------------|---|-------|-----------|--------------|----------|----------|------------|
| R&D relief | R&D identification | 1 | 0 | 0 | 0 | 1 | 6.25% |
| | R&D documentation | 2 | 1 | 1 | 0 | 4 | 25.00% |
| | Working time records | 2 | 2 | 1 | 0 | 5 | 31.25% |
| | Records of eligible costs in accordance with the Accounting Act | 1 | 0 | 0 | 0 | 1 | 6.25% |
| | Separation of eligible costs in accordance with tax laws | 3 | 0 | 1 | 1 | 5 | 31.25% |
| | Total | | 9 | 3 | 3 | 1 | 16 |
| IP Box | R&D identification | 2 | 0 | 0 | 0 | 2 | 10.00% |
| | R&D documentation | 5 | 1 | 0 | 0 | 6 | 30.00% |
| | Calculation of the nexus index | 3 | 2 | 0 | 0 | 5 | 25.00% |
| | Acquisition of a qualified intellectual property right | 1 | 1 | 0 | 0 | 2 | 10.00% |
| | Separation of income relating to intellectual property rights | 5 | 0 | 0 | 0 | 5 | 25.00% |
| | Total | | 16 | 4 | 0 | 0 | 20 |

Source: authors' own elaboration.

The study also included the identification of the reasons for not using tax preferences despite meeting the basic criterion, i.e. being involved in R&D. The respondents were asked why their companies do not use tax preferences. The respondents could choose a maximum of 2 answers out of the 6 indicated. Detailed results from this section are presented in Table 6.

TABLE 6

Responses regarding reasons for not using tax preferences

| Responses | | | | | | Percentage | Percentage in the sample of those who do not use tax preferences |
|--|-----------|----------|--------------|----------|-----------|----------------|--|
| | Micro | Small | Medium-sized | Large | Total | | |
| I did not know about R&D relief/IP box | 14 | 0 | 1 | 0 | 15 | 16.30% | 23.08% |
| The company does not pay income tax because it does not generate profit | 3 | 2 | 0 | 0 | 5 | 5.43% | 7.69% |
| The use of tax preferences is difficult and requires specialised knowledge | 20 | 2 | 1 | 1 | 24 | 26.09% | 36.92% |
| The use of tax preferences can result in an audit under the tax audit system | 16 | 1 | 0 | 1 | 18 | 19.57% | 27.69% |
| There are few benefits from tax preferences | 18 | 1 | 1 | 0 | 20 | 21.74% | 30.77% |
| We received a negative decision from the National Revenue Information System | 7 | 0 | 2 | 1 | 10 | 10.87% | 15.38% |
| Total | 78 | 6 | 5 | 3 | 92 | 100.00% | - |

Source: authors' own elaboration.

The most frequently mentioned responses indicating the reasons for not using tax preferences are as follows:

- The use of tax preferences is difficult and requires specialised knowledge.
- There are few benefits from tax preferences.
- The use of tax preferences can result in an audit under the tax audit system.
- I did not know about R&D relief/IP box.

The reasons identified can be divided into different categories: informational (promotional), technical (administrative), and legal (including risk). The analysis

shows that the lack of profit generation by the company is not the reason for not using tax preferences.

To achieve the objective of the study and develop effective recommendations for changes to address the problems of entrepreneurs, it is necessary to correctly identify the reasons for not using tax preferences and the barriers to the use of tax preferences. The respondents were asked what changes should be introduced to tax instruments. The respondents could choose a maximum of 2 answers out of the 6 indicated. Detailed results are presented in Table 7.

TABLE 7

Responses regarding changes to tax preferences

| Responses | Entities using tax instruments | Percentage | Entities not using tax instruments | Percentage | Total entities, instruments | Percentage |
|---|--------------------------------|----------------|------------------------------------|----------------|-----------------------------|----------------|
| Uniform tax rulings | 13 | 37.14% | 41 | 38.68% | 54 | 38.30% |
| The possibility of applying tax preferences in the calculation of the monthly advance CIT/PIT payment | 4 | 11.43% | 16 | 15.09% | 20 | 14.18% |
| Simplified system for recording eligible costs | 11 | 31.43% | 25 | 23.58% | 36 | 25.53% |
| The possibility of extending eligible costs under the R&D relief to include subcontracting costs from entities other than research entities | 5 | 14.29% | 9 | 8.49% | 14 | 9.93% |
| The possibility of refunding overpaid tax over a longer period than 2 years since incorporation | 1 | 2.86% | 4 | 3.77% | 5 | 3.55% |
| Speeding up the procedure for obtaining intellectual property rights | 1 | 2.86% | 11 | 10.38% | 12 | 8.51% |
| Total | 35 | 100.00% | 106 | 100.00% | 141 | 100.00% |

Source: authors' own elaboration.

The respondents made proposals for changes to tax instruments supporting innovative activities. The most frequently mentioned responses include uniform tax rulings and a simplified system of recording eligible costs. There are no differences in the responses if two groups (entities using tax preferences and entities not using tax preferences) are analysed separately. This means that the recommendations for changes do not have to be prepared for each group separately. Prior to the presentation of recommendations for changes in tax solutions, it was also necessary to verify whether there are factors that affect the implementation of R&D work and the use of tax preferences to ensure that the solutions proposed are effective and comprehensive.

The following factors were statistically analysed in relation to their impact on the implementation of R&D work and the use of tax preferences:

- age of the company,
- a separate R&D department in the organisational structure,
- cooperation with a research unit/research institute,
- the result of ongoing research and development work,
- support of a tax advisor,
- applying for a tax ruling.

The analysis of the relationship between the age of a company and the implementation of R&D work indicates (Table 8) that the percentage of entities with similar age implementing R&D work was at a similar level in each group. The percentage of entities implementing R&D work was approximately 25% in both the group of the youngest and of the oldest enterprises. In the middle group, comprising entities operating on the market for more than 3 years and less than 5 years, the percentage was less than 22%. A chi-square test was performed. At the adopted level of significance (p -value of 0.05), it cannot be assumed that entities from a particular group implement R&D work more frequently. The relationship was found to be statistically insignificant. The test confirmed that the differences were insignificant.

TABLE 8

The relationship between the age of a company and the implementation of R&D work

| | Not involved in R&D | Involved in R&D | Total |
|-----------------------|------------------------|--------------------|------------|
| Not more than 3 years | 74 (75%) | 25 (25%) | 99 (100%) |
| 3–5 years | 47 (78%) | 13 (22%) | 60 (100%) |
| More than 5 years | 143 (75%) | 48 (25%) | 191 (100%) |

Source: authors' own elaboration.

The analysis of the relationship between the presence of an R&D department within the organisational structure of an enterprise and the cooperation with a research unit/research institute during R&D work shows as follows (Table 9): less than 64% of entities implementing R&D work and having a separate department within their organisational structure cooperate with a research unit or a research institute. This is also the case for less than 27% of entities implementing R&D work but not having a department in their organisational structure. A chi-square test was performed. At the adopted level of significance (p -value of 0.05), it can be assumed that enterprises that have a department specialised in research and development work in their structure cooperate more frequently with a research unit or research institute than those that do not. The relationship was found to be statistically significant. The test confirmed that the differences were significant.

TABLE 9

The relationship between the presence of an R&D department in the enterprise and the cooperation with a research unit/research institute

| | Not cooperating | Cooperating | Total |
|---------------------------|-----------------|-------------|-----------|
| Not having R&D department | 47 (73%) | 17 (27%) | 64 (100%) |
| Having R&D department | 8 (36%) | 14 (64%) | 22 (100%) |

Source: authors' own elaboration.

The analysis of the relationship between cooperation with a research unit/research institute during R&D work and the use of tax preferences shows as follows: about 38% of entities implementing R&D work and cooperating with a research unit or a research institute used tax preferences. This is also the case for about 16% of entities not cooperating with a research unit or a research institute.

The response options "We have not started to use them yet, but we intend to do so" and "We are trying to get involved" were converted into negative responses ("No"). A chi-square test was performed. At the adopted level of significance (p -value of 0.05), it can be assumed that entities that cooperate in the implementation of R&D work with a research unit or a research institute are more likely to use tax preferences than those that do not. The relationship was found to be statistically significant. The test confirmed that the differences were significant.

The analysis of the relationship between the cooperation with a research unit/research institute during R&D work and individual R&D results. As indicated in the research assumptions, due to the risk of not meeting the criteria for expected sizes, compared to the other calculations, the Fisher's exact test was used in place of the chi-square test to examine the relationship between the two dichotomous variables. The relationship between the three options of the final results of the R&D work and the cooperation with a research unit or a research institute was found to be statistically significant. The response options "We have not started to use them yet, but we intend to do so" and "We are trying to get involved" for the question on cooperation with research units were converted into negative responses ("No"). Three most common intellectual property rights were analysed: a patent, an industrial design right, and a copyright in a computer programme.

As many as 58.06% of entities involved in R&D work and cooperating with research units indicated that their R&D work resulted in a patent. This is also the case for less than 18.18% of entities that do not cooperate with research units (Table 10). On the basis of the results of the Fisher's exact test, at the adopted level of significance (0.05), it can be assumed that enterprises that cooperate in the field of R&D work with research units or research institutes are more likely to obtain a patent as a result of R&D work. The test confirmed that the differences were significant.

TABLE 10

The relationship between cooperation with scientific units and obtaining a patent

| | Having obtained a patent | Not having obtained a patent | Total |
|-----------------|--------------------------|------------------------------|-----------|
| Not cooperating | 10 (18.18%) | 45 (81.82%) | 55 (100%) |
| Cooperating | 18 (58.06%) | 13 (41.94%) | 31 (100%) |

Source: authors' own elaboration.

Only less than 42% of entities involved in R&D work and cooperating with research units indicated that their R&D work resulted in an industrial design right. This is also the case for less than 11% of entities that do not cooperate with research units (Table 11). On the basis of the results of the Fisher's exact test, at the adopted level of significance (0.05), it can be assumed that enterprises that

cooperate in the field of R&D work with research units or research institutes are more likely to obtain an industrial design right as a result of R&D work. The test confirmed that the differences were significant.

TABLE 11

The relationship between cooperation with scientific units and obtaining an industrial design right

| | Not having obtained an industrial design right | Having obtained an industrial design right | Total |
|-----------------|--|--|-----------|
| Not cooperating | 49 (89%) | 6 (11%) | 55 (100%) |
| Cooperating | 18 (58%) | 13 (42%) | 31 (100%) |

Source: authors' own elaboration.

Only 25.81% of entities involved in R&D work and cooperating with research units indicated that their R&D work resulted in a copyright in a computer programme. This is also the case for less than 67.27% of entities that do not cooperate with research units. On the basis of the results of the Fisher's exact test, at the adopted level of significance (0.05), it can be assumed that enterprises that do not cooperate in the field of R&D work with research units or research institutes are more likely to obtain a copyright in a computer programme as a result of R&D work. The test confirmed that the differences were significant.

The analysis of the relationship between the use of tax advisor support and the use of tax preferences shows as follows: almost one in three respondents (31.11%) who use tax advisor support use tax preferences. Among the respondents who do not use the support of a tax advisor, the percentage was much lower (17.07%) (shown in Table 12). The response options "We have not started to use them yet, but we intend to do so" and "We are trying to get involved" were converted into negative responses ("No"). A chi-square test was performed. At the adopted level of significance (p -value of 0.05), the null hypothesis of independence of the characteristics should be accepted. It cannot be assumed that enterprises using the support of a tax advisor are more likely to use tax preferences. The relationship was found to be statistically insignificant. The test confirmed that the differences were insignificant.

TABLE 12

The relationship between the use of tax advisor support and the use of tax preferences

| | Not using tax preferences | Using tax preferences | Total |
|--|---------------------------|-----------------------|-----------|
| Not using the support of a tax advisor | 34 (82.93%) | 7 (17.07%) | 41 (100%) |
| Using the support of a tax advisor | 31 (68.89%) | 14 (31.11%) | 45 (100%) |

Source: authors' own elaboration.

The analysis of the relationship between the use of tax preferences and applying for a tax ruling on tax preferences to the National Revenue Information System was carried out. As much as 47.62% of enterprises using tax preferences applied for a tax ruling to the National Revenue Information System. This is also the case for 24.62% of companies not using tax preferences (Table 13). The response options “We have not started to use them yet, but we intend to do so” and “We are trying to get involved” were converted into negative responses (“No”). A chi-square test was performed. At the adopted level of significance (p -value of 0.05), the null hypothesis of independence of the characteristics should be accepted. It cannot be assumed that enterprises using tax preferences are more likely to apply for a tax ruling to the National Revenue Information System. The relationship was found to be statistically insignificant. The test confirmed that the differences were insignificant.

TABLE 13

The relationship between the use of tax preferences and applying for a tax ruling

| | Not applying for a tax ruling to the National Revenue Information System | Applying for a tax ruling to the National Revenue Information System | Total |
|---------------------------|--|--|-----------|
| Not using tax preferences | 49 (75.38%) | 16 (24.62%) | 65 (100%) |
| Using tax preferences | 11 (52.38%) | 10 (47.62%) | 21 (100%) |

Source: authors' own elaboration.

The analysis of the relationship between the use of tax advisor support and applying for a tax ruling on tax preferences to the National Revenue Information

System was carried out. As much as 48.89% (22/45) of enterprises using the support of a tax advisor applied for a tax ruling to the National Revenue Information System. This is also the case for only 9.76% (4/41) of entities not using the support of a tax advisor. A chi-square test was performed. At the adopted level of significance (p -value of 0.05), the null hypothesis of independence of the characteristics should be rejected. It can be assumed that enterprises that use the support of a tax advisor are more likely to apply for an individual tax ruling to the National Revenue Information System than those that do not. The relationship was found to be statistically significant. The test confirmed that the differences were significant.

Based on the above analysis, it should be concluded that the following relationships affect the implementation of R&D and tax preferences:

- Entities that have a separate R&D department in their organisational structure are more likely to cooperate with a research unit/research institute.
- Entities that cooperate with a research unit/research institute are more likely to use tax preferences.
- Enterprises cooperating with a research unit/research institute are more likely to obtain a patent or an industrial design right as a result of R&D work.
- Entities that use the support of a tax advisor do not use tax preferences more often than entities that do not.
- Entities using tax preferences do not apply for a tax ruling on tax preferences more often.
- Entities using the support of a tax advisor are more likely to apply for a tax ruling on tax preferences.

The analysis of barriers, reasons, and factors regarding the use of tax preferences can now be used to prepare the recommendations for changes to tax instruments in the final stage of the research process.

5. Conclusions

Gross domestic expenditure on R&D (GERD) in 2020 amounted to PLN 32.4 billion, representing 1.39% of Poland's GDP. According to the explanatory memorandum to the act of 25 September 2015 amending certain laws in connection with the promotion of innovation and introducing a tax preference (R&D relief), the goal was to reach total R&D expenditures of 1.7% of GDP in 2020 (Statistics Poland). Unfortunately, this goal has not been achieved. In view of the above, this study was carried out to identify the reasons for not using tax

preferences, barriers to the use of tax instruments and factors affecting the implementation of R&D by entrepreneurs and the use of tax preferences.

The main factors identified include appropriate organisation of R&D in the enterprise, establishing cooperation with research units and research institutes, cooperation with a tax advisor (enabling partial protection of the interests of the enterprise as the application for a tax ruling can be submitted to the National Revenue Information System and the individual confirmation regarding the correct interpretation of tax regulations can be obtained), and knowledge of fiscal instruments supporting the development of R&D.

The study results show that the study is representative and the objective has been fully achieved. This study provides an important contribution to the development of science as tax preferences supporting R&D have not been fully identified to date. The study is the basis for further research on a larger sample at a national level. The next step is to develop recommendations corresponding to the needs of entrepreneurs, eliminating the reasons for failure, and reducing the barriers.

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