# Hungarian University of Agriculture and Life Sciences

# Innovation-driven Economic Space in the European Union

Micro, small and medium-sized enterprises and innovation-driven enterprises, examination of entrepreneurial attitudes

## Doctoral dissertation theses

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# Contents

# 1. INTRODUCTION

Enterprises belonging to the SME sector generate more than half of the non-financial business economic results, and 70% of the employed in the European Union are also employed here. (Hágen & Holló , 2017) In addition, they are considered the backbone of the EU and Hungarian economy, they provide 85% of the workforce in total, and they play a significant role in the field of investments, productivity and even innovation. (Jeneiné Gerő, et al., 2021) Most of the companies in the SME sector operate regionally and do not enter international markets. The European Union has set a goal of targeted support for the SME sector, which appears in the European Union's new budget and financing models. There is a serious difference between the founding and new member states of the European Union in relation to the analysis of the innovation activity of the SME sector. (Makó, et al., 2020) Competitiveness and innovation are related to each other, according to international analyses, the perception of countries and their competitiveness depends on the innovativeness of the players in the competitive market. (Vajda, 2020)

The goal of the European Union's support policy for the SME sector is for R&D expenditures to reach 3% of GDP. (Hervas-Oliver, et al., 2021)The economic regions of Europe differ significantly from the point of view of SME sector innovation, the more developed regions benefit to a greater extent from development resources. (Hervas-Oliver, et al., 2021) Innovation is not distributed evenly even within the given regions, so regional developments need to follow the regional development needs. (Isaksen, et al., 2018)This multi-faceted perspective goes beyond companies and foresees a unique support mechanism for regions or member states, focusing on local needs in contrast to the homogeneous programs of the European Union. (Trippl, et al., 2018) This approach allows us to conclude that new development paths will emerge in the future, which emphasize the importance of local conditions and enable the creation of targeted support chains.

## 1.1. Actuality and background of the topic

Until the end of the 20th Century, domestic literature did not really deal with the changes affecting the SME sector. Competitiveness and, with it, innovation can be developed by strengthening the role of the state. (Dagnino, et al., 2020) (Szabó & Obádovics, 2018) (Matolcsy, 2020) (Turgunpulatovich, 2022) Many researchers have already dealt with the relevant set of conditions,(Vajda, 2020) (Csath, et al., 2016) and created its own ranking regarding the competitiveness of countries. Since there is no generally accepted, categorized definition for the evaluation of national economies, neither competitiveness nor innovation can be determined according to generally applicable rules. The most widespread interpretation of competitiveness is the one used by the OECD, which reads as follows: "the competitiveness of a national economy shows the extent to which a country is able - under free and fair market conditions - to produce products and services that are in demand on international markets." (Csath, et al., 2016) Members of the SME sector play a significant role in the domestic economy (Hágen & Holló , 2017) (Jeneiné

Gerő, et al., 2021), primarily because of their role in employment, they also have a significant impact on the development of national economic efficiency. (Vajda, 2020)

In the European Union's innovation policy, the previous budget cycle (2013-2020) showed little commitment to supporting the SME sector. (De Marco, et al., 2020) Recognizing the importance of the sector's role not only from an innovation point of view, but also from a national economic point of view, the European Union set itself the goal in the new budget cycle to develop a comprehensive, multidimensional innovation-based support model. (Hervas-Oliver, et al., 2021) The grants are available to businesses on structural funds channeled through governments, as well as within the framework of a direct application mechanism. Developments appear at the regional level, which necessitates the use of a multi-stakeholder perspective. (Hassink, et al., 2018) There are significant differences between the member states of the European Union regarding the level of economic development. The development of new models requires social action, where businesses, innovators , universities, states or the institutions of the European Union jointly form a common position to overcome territorial deficiencies. (Hassink, et al., 2018) Enterprises in the SME sector have lower capacities and are more dependent on external support for their development. (Hervas-Oliver, et al., 2021)Innovation at the SME level often depends on several factors, such as the quality of local and regional innovation or the complexity of support chains. (Paralli & Radicic, 2021) In the European Union, the overall innovation policy is preferred and is expressed as 3% of GDP as the expected source of development. (European Commission, 2020) (Rodríguez-Posé, 2020) (Fonyó , et al., 2016)

The new support systems should primarily support innovative enterprises, in order to ultimately result in long-term economic growth. (Deschryvere, et al., 2020) SMEs are the most worthy of support, those that show an innovative attitude and talent, by meeting the growth-supporting ideas of politics and economic actors. (Kerr, 2020) In the European Union's new support model, he sees the new engine of economic growth in overcoming structural obstacles and in the direct development of innovative SMEs. (Coad, et al., 2020 June)

## 1.2. The purpose of the research

During my research and related investigations, I strive to achieve the goals detailed below:

G1: With the help of the companies participating in the research, I will make an attempt to create an objective metric that will enable the comparison of companies and the implementation of a deep structural analysis.

G2: My quantitative objective is the analysis, classification and evaluation of domestic SMEs. Based on the revealed connections, drawing conclusions that enable general definitions. I will explore the past practice of the companies participating in the research, the ratio of R&D resources, and draw conclusions about the possibility of obtaining EU subsidies in the future, since domestic SME companies are the determining players of market growth and thus economic development.

G3: My goal, which can be applied in practice, is to prepare an economic evaluation of domestic SME enterprises, which will provide serious help in determining the

development directions of subsequent consulting or state support programs. The knowledge of previous practices and the analysis of economic activities include many research opportunities that enable advance preparation for successful participation in tenders.

G4: I would like to find out whether the development expenditures of companies applying for previous EU funds show a significant difference compared to companies that do not know about the applications or do not participate in them. What development directions can be determined for domestic companies to participate as successfully as possible in direct tenders financed by the EU in order to achieve economic growth.

G5: I formulate proposals for the entities included in the value chain, such as the state, educational actors, interest representatives, etc. with the aim of establishing a later good practice.

## 1.3. Hypotheses of the research

In verifying the hypotheses of my research, I strive to ensure that, in addition to the importance of the economic development of micro-small and medium-sized enterprises, innovation and competitiveness also play an important role in the evaluation process. By getting to know previous practices, I see an opportunity to propose an operating model for companies, which can help them learn about their own weaknesses and get a general idea of the current situation in relation to the new tenders of the EU. The order of the application procedure has not changed significantly compared to the previous budget cycle, so knowing the content and form requirements also contributes significantly to a successful application. Effectiveness is a completely different aspect, since competitiveness and innovative solutions make tenders successful.

- Hypothesis (1) **The RRI directive provides a greater opportunity to obtain subsidies in the SME sector, which presupposes the existence of a long-term strategy.**

In connection with my hypothesis, I am investigating how well Hungarian companies know the directives that can be considered the basis of EU regulation, and whether they have previously obtained information about related tenders. In light of the results, I would like to clarify the application practices of businesses, looking for connections with the resources provided directly by the European Union. According to my assumption, the SMEs included in the investigation do not know enough about the European Union's direct bidding mechanism to be able to follow it in practice.

- Hypothesis (2) **The level of integration of innovation management into the corporate strategy is related to the participation of SMEs in tenders for direct European Union funds.**

The EU's innovation policy itself is a practice organized around a globalized market, so it can be assumed that due to the advocacy of the large GNI-paying states, programs that are available to businesses operating in the richer countries of the EU appear instead, so domestic companies are not even interested in the opportunities. (Schilling & Shankar,

2019) In my hypothesis, I assume that the tender synergies of the European Union create a situation where the developing countries are not, or only to a small extent, able to meet the tender conditions due to their basic state. My study covers the knowledge of the RRI framework condition, which can be considered as a guideline for innovation, and can represent a surplus for businesses, compared to the various sources of the cohesion fund, which can be considered traditional. In my opinion, if a business meets the above-mentioned requirement, long-term innovation and sustainability will consciously appear in its development plans as an organizational principle. It can also be assumed that the RRI not only affects the development guidelines, but that the application of the guideline has a significant influence on the established operating model as well. It assumes a relationship between businesses, representatives of science and various sectors of state administration. (Burget, et al., 2016) Participation in the direct tenders of the European Union can be directly related to the level of development of the given country, as well as the size and organizational structure of enterprises. The definition of the examination of innovation is made very difficult by the fact that the activity of a given enterprise that can be considered innovative means different things in each economic area, in each country, and in the economic environment of the given country.

- Hypothesis (3) **Domestic micro, small and medium-sized enterprises use RRI less than they consider it important, based on their own RRI indicators.**

This hypothesis suggests that domestic enterprises are assumed to treat their development opportunities too closed. There can be many reasons for this, but primarily the will to preserve the knowledge already acquired prevents any advanced thinking. The most important thing is to preserve the current state, and future successes only have a small influence on the development possibilities. In the development directions of the European Union, it clearly takes a position in favor of the principle of partnership, encouraging vertical cooperation. (Mendez, et al., 2019) The partnership process still does not sufficiently take territorial inequalities and challenges into account, and thus the impact of structural political programs on development and its verifiability become questionable. The planning process of the 2021-27 budget formulates an objective that envisions a simplified, smarter, greener, more socially accepted and connected Europe. (Mendez, et al., 2019)In fact, it doesn't matter which version we consider to be the realistic future vision of the European Union, one thing all scenarios agree on is that the European Union will continue to operate under uniform framework conditions based on a common set of values. (Európai Bizottság, 2017)

- Hypothesis (4) **Domestic micro, small and medium-sized enterprises' innovation-driven development is related to the volume of direct EU subsidies received, despite the distorting effect of the innovation-based programs of the European Union.**

In this hypothesis, one of the most important economic organizing principles of the European Union appears, focusing on the operating practices of domestic enterprises. It is a basic principle known to everyone, important and represented as a value, in connection

with which we keep in mind the interests of the representation of future generations. The policy of long-term development is often - especially in developing countries - opposed to contemporary economic rationality. (Agarwal & Berm, 2017) For this reason, it is increasingly necessary to consider innovation as a global phenomenon and to avoid innovation with unfavorable effects. Resources are limited, so it is important to have an integrated model that is suitable for companies operating in the domestic market, and can also be easily replicated and adapted. The database from the questionnaire is suitable for analyzing the current situation and creates the opportunity to draw conclusions that help the above-mentioned model creation.

## 2. MATERIAL AND METHODOLOGY

The methodological processing is divided into four separate parts. The first chapter starts by presenting the process of empirical research, followed by operationalization . After the methodology of data collection, we come to the data analysis and the presentation of the statistical methods used in the last chapter.

**The process of conducted empirical research**
During the sampling required for statistical analysis, observation units are selected from the basic population using a technical procedure. There are basically two groups of sampling, probability and non-probability sampling. (Bella, 2018) The goal of every researcher is to achieve representative research.

### 2.1. Operationalization of the research model

prior to primary research is related to avoiding problems when determining the direction of the research. (Babbie, 2008)With the help of preliminary research, I determine the most important points of the research. These include the economic data of businesses, application habits, knowledge of EU directives, or the presence of knowledge of RRI conditions. The research process begins with a preliminary research.

- I carried out the preliminary research using a structured interview with experts. It is important that you provide assistance in the design of the questionnaire so that I can compile the questionnaire with the right information.
- The above information is processed using qualitative and quantitative methods using a simple content analysis method. The coding procedure of the conventional method can be derived from the preliminary research itself.(Hsieh & Shannon, 2005)
- With the results of the preliminary research, I prepared the set of questions that will be the basis of the primary research.

It is necessary to interpret, analyze, compare and transform the data of the investigated population, if the processing makes it necessary. Numerous studies prove that the sums allocated to research and development pay off in the long term. (Európa Pont, 2017)

Investments based on innovation can be the engines of the economy. The measurement of investments related to research and development occupies a very important place in the qualification of competitiveness, innovation and strategic development. Based on their type, the measurement methods can be classified into four large groups.

- Indexes
- Result statistics, adjacent page pairs
- Composite numbers or indicators
- Measurement modeling

In order to apply the above methods, in addition to the database created by myself, I use the secondary databases of the OECD, KSH and EUROSTAT as a basis, supplemented by the secondary databases of scientific journals and studies.

At the end of the research, I subjected the database to a cluster analysis, with which I organize the companies into groups, which fulfill the sustainability criteria and which do not. The classification can only be considered relevant if the company providing the data under investigation includes all aspects of sustainability proportionately. Compliance with the RRI criteria is extremely important as the organizing principle of the current budget cycle.

The data to be extracted make it possible to provide a comparative value to the companies participating in the sample as a result of the model, but the voluntary nature of data provision makes data extraction uncertain. To avoid this, I conduct the preliminary research, which thus enables the indexing of sustainability, and with it the examination of hypotheses.

To evaluate the companies, I subject the obtained values to a hierarchical cluster analysis. The well-defined industry classification is suitable for the application of the method if:

- We define the activity well
- We get a data set that can be compared with economic data
- Data collection methods are uniform
- We are looking for general relationships, not a specific industry analysis

## 2.2. Methodology used to evaluate the RRI knowledge material of the companies included in the sample

After examining the sustainability of the companies in the sample, I will examine the European Union practice in accordance with the RRI directive.

The set of questions created during the preliminary research creates an opportunity for the subsequent qualitative analysis to provide an accurate answer about the knowledge base of the companies included in the sample population. The set of questions is developed with the help of expert interviews, which are semi-structured and moderately long, and create an opportunity to learn about the theoretical background of a carefully structured business. (Babbie, 2008)We can get a comprehensive and accurate picture of a specific company's innovative sustainable developments, and it also provides data on their application habits. The interviews are analyzed using simple content analysis, where I

chose the conventional solution among the three content analysis options.(Hsieh & Shannon, 2005)

In this point, in addition to the RRI, the entrepreneurial knowledge material related to the European Union's direct tendering practice is also revealed. RRI is natural, sustainability and innovation cannot be separated by a sharp line, they are overlapping areas. In the subsequent analysis, I will prove the effectiveness of innovation and sustainability with concrete data.

## 2.3. Methods of determining the existence and effectiveness of innovation

To measure the effectiveness of innovation, I use the indicators for measuring innovation as a basis. I defined the following indicators that can be used to express innovation (Bajkó, 2019):

- In terms of entrepreneurial activity: the totality of R+D+I resources in the light of capital composition (European Commission, 2019)
- Sustainability and rational use of costs in connection with direct EU funds (Illés, et al., 2013)
- Proportion of intention to participate in a direct tender for the entire population
- The appearance of an entrepreneurial attitude in innovation-oriented developments

I examined the obtained figures with a statistical analysis, from which I expect the following results:

- Defining the role of innovation among businesses
- Knowledge of the role of responsible development and the rate of its application
- The ability to obtain direct European Union funds compared to the level of expenditure
- Other economic data
- Comparison of secondary databases with the obtained results

## 2.4. Data collection process and sample characteristics

The data required for empirical research come from several sources. Participation in the survey was done on a voluntary basis and based on a random inquiry by anonymous questioning. The willingness to fill in online resulted in only around 40% of cases, so I supplemented the database with random telephone interviews based on the Opten database. For this reason, the sample cannot be considered representative. A sample is representative if the research data characterize not only the participants, but also represent a larger group. (Bella, 2018)

I used the IBM SPSS Statistic software to analyze the data. The software enables the search for complex patterns and the discovery of deep relationships using statistical modeling. SPSS supports the analysis and manipulation of many types of data, as well as almost all formats of structured data. The software also supports spreadsheets, plain text files and relational databases such as EXCEL, SQL, SATA and SAS. SPSS also provides

data analysis for descriptive and bivariate statistics, predicting the outcome of numbers, and identifying groups. It also enables data transformation, graphs and direct marketing functions. The software displays open data as a table. The secondary variable view displays metadata that describes the variables and data entries in the data file. (Huzsvai & Vincze, 2012)

Statements prepared on a five-point Likert scale are used to assess the application practice of domestic SMEs and the knowledge material of RRI. The difference between endpoints fluctuates between disagreement and agreement. The questions of the questionnaire are grouped around 4 topics, which are contained in the first table.

The number of companies participating in the research, i.e. filling out the questionnaire directly and indirectly: 283. The questionnaire contains a total of 39 questions in 4 groups. Filling in the questionnaire was voluntary and based on self-declaration.

## 3. RESULTS

I start with a descriptive statistical analysis of the evaluation of the companies in the sample, divided into groups of questions. This helps to get to know the companies included in the sample, and provides a good basis for examining hypotheses.

### 3.1. Examination of hypotheses

For the analysis of the database created on the basis of self-declaration, quantified data is necessary for the preparation of a deeper analysis. For this reason, I group the responses to the RRI criteria by simple indexing. The values vary from 0 to 25, so a deeper statistical analysis can be performed based on quantified data. Two indexes are created in the first round, the RRI importance index and the application index, the distribution table of which is shown in Table 1.

**Distribution board**

| | Variables | |
| | Dependent | Independent |
| | RRI importance index | RRI Application Index |
| --- | --- | --- |
| Positive values | 82 | 82 |
| Zero values | 0 | 0 |
| Negative values | 0 | 0 |
| Missing values | 201 | 201 |
| System loss | 0 | 0 |

**1. table Distribution table RRI indices, Source: Own editing**

The entire sample is 283 enterprises, and of these, we find 82 enterprises that filled in the questions related to the application and the importance index.

**H1: Knowledge of the RRI directive provides a greater opportunity to receive subsidies in the SME sector, which presupposes the existence of a long-term strategy.**

11

*The regions where the average GDP of the European Union does not exceed 75% were not able to catch up even with previous structural reforms.* (Hutkai, 2022)*The assumed reason for the failure is the unequal distribution mechanism, which resulted in the strengthening of development differences.* Structural policy can be seen as income distribution rather than development policy, because differences are not reduced due to the inefficiency of convergence. (Hutkai, 2022)

Two indices were created from the answers to the questions, the application index and the importance index. The application index was created based on the entrepreneur's own declaration, and only 29% answered the questions. While 100% of the entrepreneurs participating in the questionnaire were willing to answer the questions of the importance index.

**RRI Application Index**

| Industry | N | Alpha subset = 0.05 |
|---|---|---|
| | | 1 |
| Service provider | 29 | 18.6207 |
| Reseller | 24 | 20.5833 |
| Manufacturer | 23 | 20.6522 |
| Both | 6 | 21.3333 |
| Sig . | | ,125 |

Group averages in homogeneous subsets are shown.
the. Sample size of harmonic means = 13.972.
bThe groups are unequal in size. We use the harmonic mean of the groups. Type I error rates are not guaranteed.

**2. table F-test table RRI application index industry comparison, Source: Own editing**

The second part of the hypothesis can be evaluated after the direct analysis of the questionnaire. Table 2 compares the RRI application index with the industry distribution. Based on the data in the table, it is clear that the industrial activity shows a high value in the case of production and resale. It is also clear that the service companies apply the RRI criteria the least when running their own companies, although they are the most.

Thus, the industry comparison brought out companies that produce and sell their products with a higher value among the respondents. It is useless to examine the respondents based on the access to EU funds, because in the descriptive statistical analysis I also mentioned that not a single respondent won support by building a consortium. The Green Deal, and Horizon 2020 programs were indicated to a small extent as sources for which the respondents had previously sent applications. The hypothesis also assumes that the application of RRI and the creation of a strategy show such a connection that those who consciously plan the future, that is, create a strategy, demonstrably apply the RRI criteria to a greater extent in their own business. Based on the data, we can assume a moderately strong relationship. Therefore, the RRI application index of companies that consider the creation of a comprehensive strategy to be important is higher. However, the hypothesis

covers the time period, that is, it assumes the long-term strategy behind the application of the RRI criteria.

RRI Application Index

| | Sum of squares | df | meaning of square | F | Sig . |
|---|---|---|---|---|---|
| Within a group | 61,084 | 2 | 30,542 | 3,519 | ,035 |
| Out of group | 659,600 | 76 | 8,679 | | |
| Altogether | 720,684 | 78 | | | |

**3. table One-way variance analysis between the RRI application index and the strategic time period, Source: Own editing**

Table 3 shows a weak significant relationship between the RRI application index and the strategic planning timeframe.
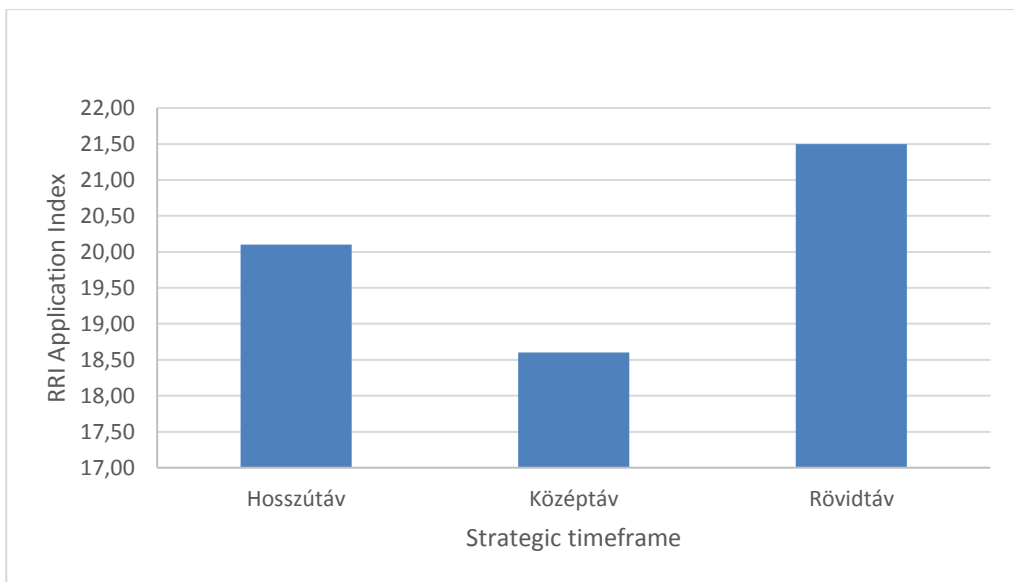


**1. Fig. RRI application index and the relationship between the planning time frame source: own editing**

The interpretation of Figure 1 helps to explain the hypothesis. As a result of the comparison, it is clear that the short and long time periods have higher values, but the short time period received the highest value. Overall, it can be stated that hypothesis H1 is not correct, because theoretically, knowledge of the RRI criteria provides greater opportunities for businesses, as this is included in the principles of distribution of direct resources of the current EU budget. Strategy creation is typically present in a short period of time among businesses applying RRI criteria. Businesses using RRI criteria typically have the near future in mind when creating their business strategy.

**H2: The level of integration of innovation management into the corporate strategy is related to the participation of SMEs in tenders for direct European Union funds.**

To investigate the second hypothesis, I created an index again, but unlike the previous ones, this one did not summarize the RRI criteria, but summarized and expressed the development opportunities and innovation management responses in a quantified manner. The index numbers the answers in the range of 1-9, so the pattern of the obtained values can be examined and grouped depending on other variables. I named this index the KTindex , which shows the participation from direct subsidies in the examined sample. The answers to all questions are part of the index that ask about direct European Union support funds.
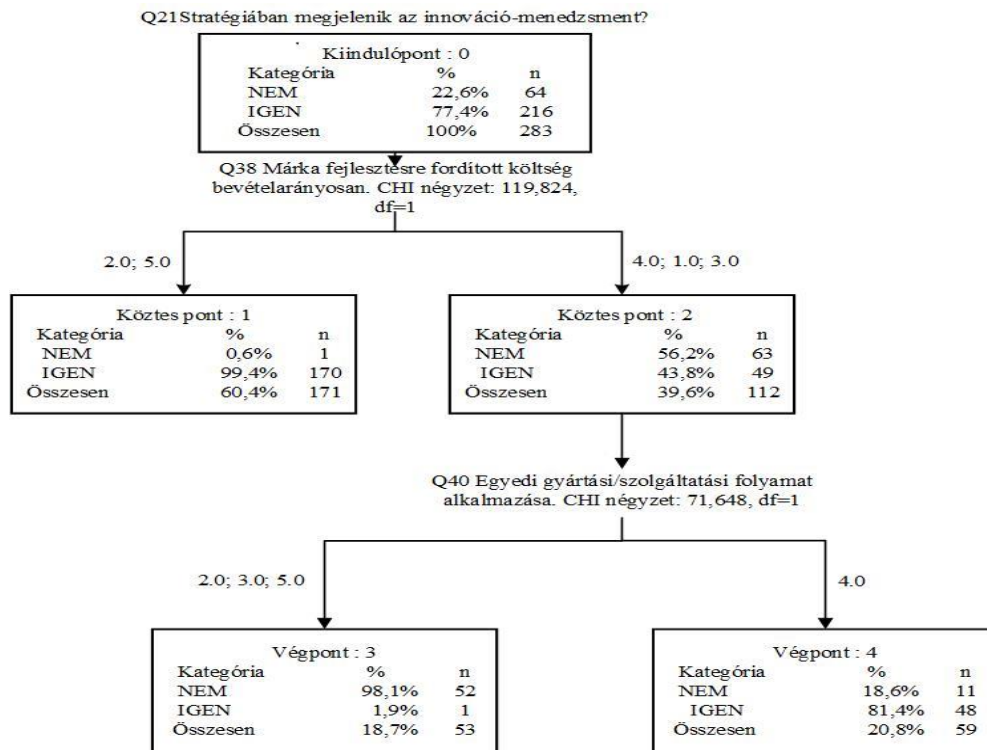


**2. Figure: Decision tree KTindex SPSS program system image, Source: Own editing**

Unplanned for, the KT index became a dummy variable. A significant relationship exists in the field of individual production and service, as I found 4 nodes during the investigation. Based on Figure 2, it assumes a deeper connection between innovation management and unique production and service. Two large groups are visible, where an interesting picture emerges. 99.4% (170) of the members of group A, where the number of responses of the group is 171, specifically apply innovation management, but show a division in the field of brand development. Either he considers it particularly important by giving maximum marks, or he shows little interest in his answers. The distribution of group AB is 56.2% and 43.8% between no and yes answers, as regards innovation management, however, the answers to brand development also show a deviation. The companies that answered questions related to innovation management, i.e. 283

respondents in all, also answered questions related to brand development. 40% of the entire sample also answered regarding the application of the unique production/service process. Further studies are needed for a deeper understanding of the relationships. Based on the results obtained , there is no economically acceptable explanation for the revealed phenomenon, because the variables show contradictory values, however, they highlight that the importance of brand development and the unique production/service process is considerable in innovation management.
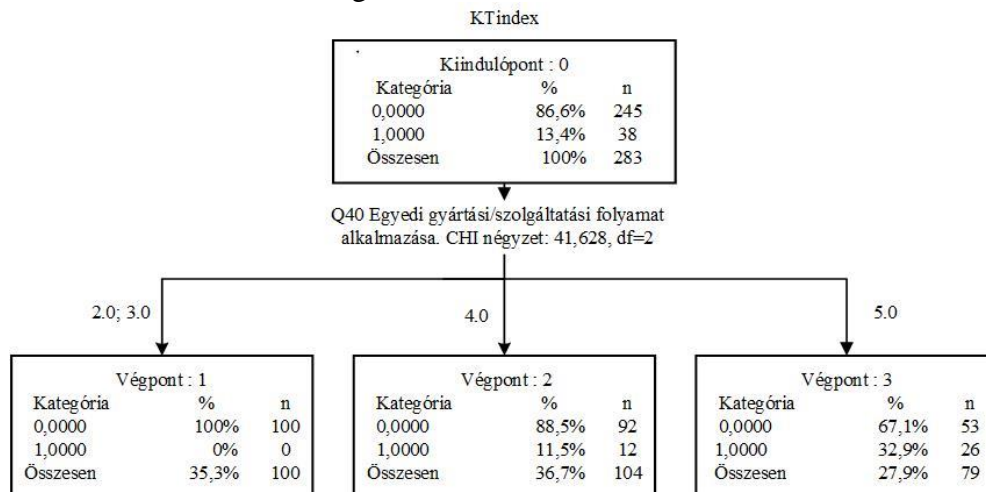


**3. Figure: KTindex and Individual production/service process application decision tree SPSS program system image. Source: Own editing**

If I examine the KT index and the decision tree of the answers to the individual production/service question, 3 groups emerge (Figure 3). The three groups can be named as follows. According to the data in Figure 3, the first group includes 35.3%, i.e. 100 enterprises, which use unique procedures to a small extent. The second group, who consider it a good decision to use individual procedures, is present in about 36.7% (104) of the total population. And the third group is those who like to apply unique procedures in their activities. This group is 27.9% (79) of the basic population. The groups are well separated from each other, so we can assume a significant relationship.

The hypothesis seeks to answer whether the company's strategic level is related to the possibility of accessing direct funds from the European Union. To the question, is there a connection between innovation management and the KTindex criteria, the answer is clearly yes. The KTindex combines innovation parameters and expresses them as quantified data, and when they are placed in a joint decision tree with the existence of innovation management, multi-level relationships are revealed. One of the important results of the decision tree from the point of view of the research is that it created 3 clearly distinguishable groups. In cases where the application of individual production/service is low, they cannot participate in direct subsidies at all. If this value given on the basis of self-declaration increases, the proportion of companies receiving direct support is higher and higher. The two components, i.e. innovation management and direct support, are

connected at the same intersection, and this is the application of the unique production/service process.

In the European Union's innovation policy, little commitment to supporting the SME sector was shown in the previous budget cycle. (De Marco, et al., 2020) In the new budget cycle, the European Union has set itself the goal of developing a comprehensive support model based on multidimensional innovation. (Hervas-Oliver, et al., 2021)The grants are available to businesses on structural funds channeled through governments, as well as within the framework of a direct application mechanism. Developments appear at the regional level, which necessitates the use of a multi-stakeholder perspective. (Hassink, et al., 2018) Therefore, innovation management is a fundamental condition for successful access to direct European Union funds. The two activities that significantly influence innovation management in the creation of business strategies are brand building and the application of a unique production/service process.

In order to name the clusters, it is necessary to examine each group. The first step is to identify the highlighted significant answers and define them.
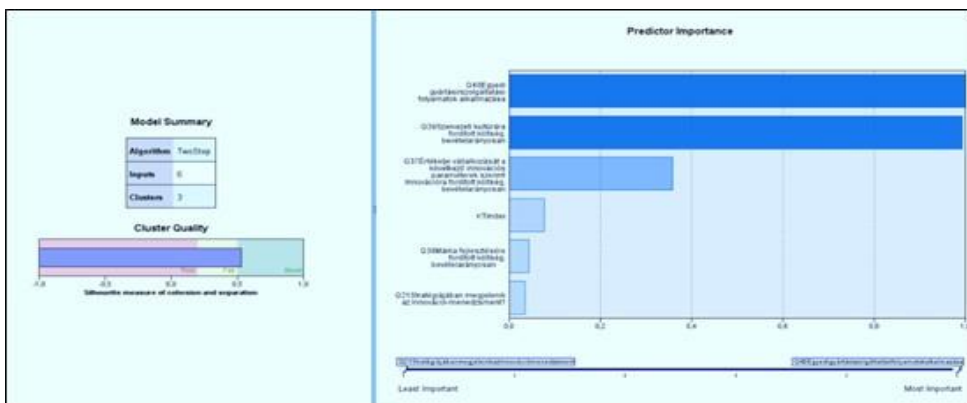


**4. Fig. Cluster quality diagram, Source: Own editing**

Figure 4 shows a strong relationship between the members of the groups belonging to each cluster. Two determining variables are present. One is the use of custom manufacturing/service and the existence of an organizational culture

The members of the first cluster typically spend an above-average amount on innovation, the brand is of particular importance to them, and they show a moderate interest in organizational culture, and they have a similar opinion about unique production/service processes. For the enterprises belonging to the second cluster, the amount spent on innovation is important, the existence of the brand is important, special attention is paid to the organizational culture and unique procedures in the enterprise. For the members of the third cluster, the amount spent on innovation is extremely important, the importance of the brand is above average, as well as the existence of organizational culture and unique procedures. I classified the three groups based on their strongest characteristics. Brand-centered innovators belong to the first cluster , hence the cluster's name. The second group includes companies that pay particular attention to the development of organizational culture and unique procedures. Therefore, this cluster was named the unique production

16

and organizational development cluster. While for the third group, the most characteristic behavior is the level of investment in innovation. Thus, that cluster was named the innovation investors cluster.

So the names of the three clusters are:
- Brand-centered innovators : 1
- Individual production and organizational development cluster: 2
- Innovation investors cluster: 3

The second hypothesis assumes that innovation management is included in the corporate strategy and that its level is related to the success of direct European Union tenders. The existence of innovation management and strategy creation shows a relationship with the innovation parameters. This is supported by a two-level depth decision tree and a cluster analysis. However, the European Union's direct tenders show no correlation with innovation management, neither with innovation criteria, nor with strategy creation. Thus, based on the above, it can be stated that the hypothesis cannot be verified.

**H3: In the system of innovation criteria used by the European Union, domestic micro, small and medium-sized enterprises use them less than they consider important based on their own RRI indicators.**

Regression analysis is a well-applied mathematical model that makes it possible to explore the relationships between qualitative variables. Here, however, the answers to the questionnaire were quantitative answers, given in a Likert scale, so I used the indices to create a quantitative state suitable for the study. Since I included one dependent and one independent variable in the regression, I am examining a simple linear regression, which is meant to verify the relationship between the two variables. His analysis highlights that the regression was run in 81 cases and only found an error in one value, that is, the relationship is strong and a mathematical relationship can be assumed between the RRI application and RRI importance indices. The data of the questionnaire was prepared on the basis of a self-declaration, from which I created the indexing.

I will continue my further analysis by exploring the correlations between the answers to other questions of the questionnaire. The hypothesis can be analyzed more deeply in relation to the issue of responsible innovation in connection with three other questions and their relationship to each other. Based on the previous answers, there is a strong relationship between the two indices of the RRI. In addition, we can also infer a cause-and-effect statistical relationship. There are twice as many companies that apply the RRI criteria in their daily work as those who consider its application important. Businesses that consider RRI guidelines important marked answers in the area of their investments and environmental protection, where the relationship is considered certain, but very weak. So, based on the third hypothesis, it can be stated that there is a significant relationship between the RRI application and the importance index, but the direction of the relationship is not clear. I examined the indices in connection with three topics, and in the field of environmental protection, the application shows a stronger relationship. In the other two cases, importance came to the fore, but not to a significant extent. Due to the above reason,

the hypothesis cannot be fully verified, and even the opposite result was obtained in the field of environmental protection.

The fourth and last hypothesis of the doctoral thesis examines the RRI directive in the context of European Union direct funds.

**H4: The application of the RRI directive by domestic micro -small and medium-sized enterprises in their innovation-driven development is related to the volume of direct EU subsidies received, despite the distorting effect of the innovation-based programs of the European Union.**

I started the study using the cluster analysis method. The first cluster does not prominently carry any RRI values. You can call them skeptics, since the division is clearly visible. The second cluster is strongly public and gives access to the results. Access to scientific education is decisive, it supports gender equality and ethical soundness is important to them. This cluster can be called the cluster of open innovators . The members of the third cluster feel a moderately strong attachment to the public and the sharing of results. Although they are happy to involve the public in the innovation process, they prefer to do so because access to scientific education is not one of the most important criteria. Presumably, the goal is the cheaper extracted knowledge rather than the high-cost investment. They apply gender equality moderately in their own businesses, but only generally consider it to be of particular importance. The situation is the same in the field of ethics, since it represents a strong value when applied, but it was given a special value only in terms of its importance. In summary, I name the characteristics of the third cluster as the cluster of human innovators . So the three clusters:
- They are skeptical
- Open innovators
- Human innovators

The examination process continues with the effects of the indices on each other. I have previously used the KT index in connection with the proof, and I also found a linear regression between the RRI application and importance indices. However, this is now the case in Table 60, where the KTindex also shows a correlation with the RRI application index and the RRI importance index. The application index shows a moderately strong correlation, that is, a significant relationship, while the importance index assumes a certain correlation, but a weak relationship. Therefore, companies that use the RRI indicators are more successful in the tenders announced in the direct tender structure of the European Union. This relationship is highly correlated and assumes a significant relationship, so further in-depth studies are warranted in order to gain a deeper understanding of the relationship. The development of the brand is of decisive importance for those companies that know or know and apply the RRI criteria. Among the enterprises included in the questionnaire, the enterprises that apply the criteria are listed with a lower value in brand development than those that determine the importance of the criteria in theory. Of course, since the data provided was recorded on the basis of self-declaration, the conclusions must be drawn in light of this. Companies using RRI spend less on developing organizational

culture. The next aspect of investigation is the use of a unique production/service process. On a theoretical level , they consider the cost of organizational culture more important than applying it in reality. The unique production/service process z would theoretically be supported in a larger amount by the companies participating in the questionnaire, since the applying companies are present with a lower value. The cost spent on z innovation shows significant volatility, although its intensity represents a higher value among companies using RRI.

Overall, it can be stated that for the 4 comparisons examined, the importance, that is, the theoretical agreement, takes on a much higher value than the practical application. The reason for this may be that those entrepreneurs who have encountered the various costs of innovation management in practice, as well as the potential benefits related to them, experience its effects. Thus, based on their experience, they spend an amount in proportion to their revenues for innovation management during their operations. Therefore, the companies operating with the applied RRI criteria, although they show a similar trend as their counterparts who agree in theory, still apply the RRI criteria with a lower intensity, yet they are more successful in the field of direct European Union funds.

I have already proven that companies that apply the RRI directive participate more successfully in direct European Union tenders than companies that do not apply it. Within the European Union, innovation processes in developing countries can only be adapted along economic characteristics. *Europe's regions differ significantly from the point of view of SME innovation, more developed regions benefit more from development resources.* (Hervas-Oliver, et al., 2021) Innovation is not distributed evenly even within the given regions, so regional developments need to follow the regional development needs. (Isaksen, et al., 2018)This multi-faceted perspective goes beyond companies and foresees a unique support mechanism for regions or member states, focusing on local needs in contrast to the homogeneous programs of the European Union. (Trippl, et al., 2018) The European Union launches programs that the representatives authorized according to the rules of representative democracy can bring into force with their majority support. The economic and innovation differences are a given, so access to the programs is a disadvantage for Hungarian companies even if they participate in the same market. Therefore, in relation to the examination of the hypothesis, I consider it justified that the application of the RRI means a greater opportunity for domestic SMEs to access direct European Union funds, but also that homogeneous programs represent a disadvantage and distort access and thus market conditions.

## 3.2. New and novel scientific results

The goal of the doctoral evaluation is to achieve a new or innovative result, thereby contributing to scientific life. Based on my objectives, I formulated the hypotheses, the purpose of which is to formulate proposals based on the knowledge of the enterprises of the domestic SME sector in connection with the achievement of direct European Union tenders.
- One of the most important results is that the enterprises participating in the sample do not apply the RRI criteria thinking along the long-term strategy in terms of

increasing competitiveness or sustainability. This may be due to the fact that EU funds are seen as a liquidity opportunity.

- It is a surprising result that among the companies that filled out the questionnaire, there are extremely few that have previously participated in European Union tenders, and not a single one has participated in building a consortium. This can perhaps be traced back to the fact that each entity keeps its own know-how and does not wish to share it with others, while it misses out on the possibility of obtaining direct resources.
- The enterprises included in the sample are aware of the concept of innovation and innovation management, and a significant majority of them use it according to their own declaration. However, the responsible research and innovation directive, although considered important, is applied by few in daily practice. Since the companies in the sample do not like to form consortium partnerships with other companies, the manager's expertise in innovation can be a facilitator of innovation. For these reasons, all innovation is concentrated around personal knowledge, which is always realized according to the limited rationality of the given person, and thus cannot be effective when measured in absolute terms.
- Based on the responses to the questionnaire, the companies included in the sample are at a disadvantage in the unified European Union support system compared to companies operating in the founding countries. The reason for this can be found in the economic development of the region and within it our country, language barriers, entrepreneurial attitude and the legal environment.
- The application of the RRI directive by the responding enterprises shows a correlation with the tender funds received. Although the willingness to fill in the self-declared sample is only around 30% for own businesses. According to the context, those who apply it are more likely to win the tenders.
-

## 4. CONCLUSIONS, SUGGESTIONS

I started with a descriptive statistical analysis of the evaluation of the companies in the sample, divided into groups of questions. This helps to get to know the companies included in the sample, and provides a good basis for examining hypotheses.

### 4.1. Verification of hypotheses

Overall, it can be stated that hypothesis H1 is not correct, because theoretically, knowledge of the RRI criteria provides greater opportunities for businesses, as this is included in the principles of distribution of direct resources of the current EU budget. Strategy creation is typically present in a short period of time among businesses applying RRI criteria. Businesses using RRI criteria typically have the near future in mind when creating their business strategy.

The second hypothesis assumes that innovation management is included in the corporate strategy and that its level is related to the success of direct European Union tenders. The existence of innovation management and strategy creation shows a relationship with innovation parameters. This is supported by a two-level depth decision tree and a cluster analysis. However, the European Union's direct tenders show no correlation with innovation management, neither with innovation criteria, nor with strategy creation. Thus, based on the above, it can be stated that the hypothesis cannot be verified.

Based on the third hypothesis, it can be stated that there is a significant relationship between the RRI application and the importance index, but the direction of the relationship is not clear. I examined the indices in connection with three topics, and in the field of environmental protection, the application shows a stronger relationship. In the other two cases, importance came to the fore, but not to a significant extent. Due to the above reason, the hypothesis cannot be fully verified, and even the opposite result was obtained in the field of environmental protection.

In connection with the fourth hypothesis, it can be stated that in the 4 examined comparisons, importance, that is, theoretical agreement, assumes a much higher value than practical application. The reason for this may be that those entrepreneurs who have encountered the various costs of innovation management in practice, as well as the potential benefits related to them, experience its effects. Thus, based on their experience, they spend an amount in proportion to their income for innovation management during their operations. Therefore, the companies operating with the applied RRI criteria, although they show a similar trend as their counterparts who agree in theory, still apply the RRI criteria with a lower intensity, yet they are more successful in the field of direct European Union funds. Therefore, in relation to the examination of the hypothesis, I consider it justified that the application of the RRI means a greater opportunity for domestic SMEs to access direct European Union funds, but also that homogeneous programs represent a disadvantage and distort access and thus market conditions.

## 4.2. My dissertation proposals

The existence of innovation management and strategy creation shows a relationship with innovation parameters. However, the direct tenders from the European Union do not show a connection with innovation management, neither with innovation criteria, nor with the creation of strategy based on statistical modeling. This may be due to the low sample size, or the voluntary nature of the response, the secrecy due to business interests, since it is a logical assumption that if I plan the strategy in advance, I can participate in the tender much more successfully. The basis for obtaining direct funds is based on joint action, because domestic companies need to participate in building a consortium in order for the same program to appear simultaneously in several countries of the European Union. Here, however, domestic enterprises are at a disadvantage based on the data of the questionnaire. During the investigation, it was clearly revealed that there is a direct correlation between the RRI application and the importance index, but the direction of the relationship does

not depend linearly on the innovation management. The type of innovation management largely determines the strategy and thus the theoretical and practical procedures differ from each other. It is important and worth highlighting that there is a connection between the theoretical application of responsible innovation and its practical operation, but the intensity of the applied criteria shows a lower value.

The European Union launches programs that the representatives authorized according to the rules of representative democracy can bring into force with their majority support. Given the economic and innovation differences, access to the programs would be a disadvantage for Hungarian companies even if they participated in the same market. Based on the data from the questionnaire, 99.3% of the companies are domestic market players, which means that it can be stated that the programs of the European Union are more difficult for domestic companies due to innovation and economic differences.

Although the development strategies of the European Union help domestic businesses, at least without regional programs, the utilization of the development resources will only be utilized with lower efficiency, since a part of the resources will be used to overcome the differences. It is therefore an important suggestion that programs be developed in the current budget cycle of the European Union that result in the reduction of differences. In order to develop the programs, it is necessary to plan based on the economic characteristics of the given country or region and to focus on the strengths. It is not necessary to implement the subsidies through state systems, direct subsidies create an opportunity to implement targeted developments. The European Union, based on the principle of subsidiarity , takes a position in favor of the lowest decision-making capacity, so the planning and implementation of socially and economically founded projects must be promoted for local communities. The state role would be concentrated at the level of control and legality, observing and enforcing the legal framework.

The European Union could play a significant role not only in the development of programs, but also in the development of the national economy. Through the domestic banking system, the deductibles needed for tenders could be provided under favorable conditions, with the deductible being available in the form of subsidized loans. Here, too, it is the responsibility of the state to monitor and enforce legal conditions, creating opportunities for businesses to adopt practices operated by businesses in other countries through networking and consortium building.

The role of the state becomes significantly important here, since the creation of networks cannot go through a system controlled from above . The state, as an intermediary, can participate in the establishment of relationships through workshops, thereby helping to build networks. The current budget of the European Union is prepared according to principles such as responsible innovation and research. The importance of the state's role is enhanced, because through education it can indirectly influence the creation of human resources where the knowledge of natural persons makes them ready to convey information and to build a national entrepreneurial advisory network similar to accountants or tax advisors. Helping the international expansion of this network with continuous training and practical education, because this makes networking automatic and becomes a self-organizing process, since the perspective visions of the European Union

and thus its programs are constantly changing. Only a well-trained and well-connected system can respond to the needs in a prepared manner.

In the current situation, businesses in the SME sector make little use of the RRI guidelines and thus access to direct funds remains at a low level. Higher education and adult education cannot be completed only in the field of theoretical training models. Universities, as the main sources of the knowledge base, can be seen as a connecting point in the exploitation of development opportunities. Such a connecting point can also be a non-governmental organization, a foundation dealing with social issues or an interest representation. However, the latter do not have the same degree of expertise as universities, so the involvement of universities can determine success. The educational model can hardly keep up with economic needs, because businesses protect their own knowledge and only open up to external parties if they see its economic benefit. So, universities are organized around the exploitation of direct European Union resources and have a strong networking potential. Here it is necessary to emphasize that the smaller entities of the SME sector have a greater need for development support, so it would be worthwhile to focus on this. Such a program could be a training system supported by the chambers, a practical network-building model. Support and bank pre-financing obtained through the support of universities can create a good basis for other enterprises to follow the example.

Of course, the above-mentioned entities are not responsible for the fact that my research into the knowledge material of direct European Union subsidies ended with such a poor result. The personality of the individual, the entrepreneur, is also extremely important. The entrepreneurial attitude is typically based on preserving knowledge and reducing costs. Here, however, it is about something else, open thinking, taking over the practice of others and making it workable, social responsibility is the key to success in domestic conditions . The adoption of practices found in other countries of the European Union could ensure economic development and a high volume of employment in the country over a longer period of time.

The most important suggestion is to be found in the development of the vision. Just as for a business, it is also important for a country to define its strategy according to several time frames. While Asian countries create 60-80-year strategies, including development opportunities, Hungary's outlook is generally formulated up to 2030. Of course, this formulates good and decisive guidelines, but it does not prepare the entrepreneurs operating in the country for the new challenges. How will a micro-entrepreneur auto mechanic meet the challenges of electric cars? How can a small business baker make significant progress in the field of electro-mobility? Under what conditions can a domestic medium-sized enterprise develop unique solutions in the field of electrical systems supporting production processes? The questions revolve around a topic, the answers to which can be provided by the free flow of information and the support of an entrepreneurial attitude. A state-designed long-term strategy, in addition to the coordination of university knowledge bases, with the support of professional organizations and, of course, state control, can significantly increase the ability of domestic companies to successfully apply for direct European Union funds. Effective relationships can contribute to reaching new markets, establishing new economic

relationships despite language barriers, and developing strong economic planning due to the publicity of the strategy.

The purpose of the thesis is to reveal the points that hinder domestic companies in the European Union competition. I think the results revealed in the field of responsible research and innovation carry a strong message regarding future developments. Helping businesses is an interest that can be formulated both at the level of the individual and the community, respecting the independence aspirations. In possession of a state strategy, a network of consultants could also effectively help business leaders, and with this the national economy could avoid possible stagflation resulting from the inflection point.

In summary, the research shed light on the connections and domestic conditions in the SME sector. There is access to direct resources, but the development of relationship networks is weak, so it has serious development potential. It is necessary to help businesses understand and apply European Union directives, as strategic planning is a great help in obtaining subsidies. In theory, the issue of responsibility is considered important by a larger number than the number of people who apply it in the field of daily work, that is, they know the objectives, but do not apply them. Although our situation is already more difficult due to the domestic environment and language barriers, the responsible planning and development used provides a better chance for direct applications in connection with European Union grants. I would be more successful with longer-term strategic planning at the micro and macro level, and if the calls for tenders took Hungary's special needs into account and did not further distort the economic opportunities.

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**LIST OF TABLES**

**LIST OF FIGURES**

# PUBLICATION LIST (IN MTMT FORMAT)

1. Bajkó, Norbert ; Fülöp, Zsolt ; Pércsi, Kinga Nagyné ✉

   Changes in the Innovation- and Marketing-Habits of Family SMEs in the Foodstuffs Industry, Caused by the Coronavirus Pandemic in Hungary

   SUSTAINABILITY 14 : 5 Paper: 2914 , 17 p. (2022)

2. Fülöp, Zsolt ; Bajkó, Norbert ; Nagyné Pércsi, Kinga

   A magyar élelmiszerlánc mikrovállalkozásainak elemzése a koronavírus által okozott fogyasztói trendváltozásra adott válaszuk alapján

   GAZDÁLKODÁS 66 : 6 pp. 559-576. , 18 p. (2022)

3. Fülöp, Zsolt ; Bajkó, Norbert

   PARAMETRIZING ENTERPRISE PROCESSES IN THE EUROPEAN UNION'S FRAMEWORK

   In: Bálint, Horváth; Péter, Földi (szerk.)International Conference of Economics PhD Students and Researchers in Komarno

   Budapest, Magyarország : Association of Hungarian PhD and DLA Students (2021) 159 p. pp. 6-16. , 10 p.

4. Fülöp, Zsolt ; Bajkó, Norbert

   Financial goals of the European Union: Analysis of a target-driven budget concept from the perspective of the innovative SME sector

   INTERNATIONAL SCIENTIFIC JOURNAL INNOVATIONS 9 : 2 pp. 51-56. , 6 p. (2021)

5. Fülöp, Zsolt ; Bajkó, Norbert

   A magyar KKV-szektor lehetőségei a 2021-től kezdődő Európai Uniós programidőszak támogatási rendszerében –az innovatív kisvállalkozások belépője az EU programjába

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   Budapest, Magyarország : Óbudai Egyetem (2021) 360 p. pp. 6-16. , 10 p.


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