

Doctoral (PhD) Dissertation

**THE EFFICIENCY FACTORS OF THE EUROPEAN UNION
FUNDED PUBLIC SECTOR PROJECTS**

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1. The background and aims of the doctoral thesis

1.1. The EU support scheme

Hungary's accession to the European Union raised a number of institutional, operational, procedural and sovereignty issues. Some of the questions geared to "How are we going to get money from the EU?" (*Balogh, 2003*). The answer is provided by the European Union's regional and structural policy.

The European Union set the objective of creating economic and social cohesion among the member states, minimizing the differences between the development levels, which ensures the EU citizens' prosperity, "diminishing unemployment to negligible levels, uniformly developed regions, rural areas, the realignment of wages and salaries and single - reaching EU-average- pensions" (*Flamm-Nagy, 2003*) The stated objectives are implemented by the EU's regional and structural policy through support and financing development projects. The European Union contributes billions of euros annually to support member countries' development programs and projects through the Structural Funds and the Cohesion Fund. The grants for development programs can be obtained by tenders.

Five major funds support jointly the economic development of all member states of the European Union, in line with the Europe 2020 strategic goals (*Net1*):

- European Regional Development Fund (ERDF)
- European Social Fund (ESF)
- Cohesion Fund (CF)
- European Agricultural Fund for Rural Development (EAFRD)
- European Maritime and Fisheries Fund (EMFF)

All EU regions can benefit from the ERDF and ESF funding. However, the Cohesion Fund may support only those countries where the per capita gross national income (GNI) is below the 90% of the EU average. Hungary receives the most resources through the Structural Funds, which aim to support underdeveloped

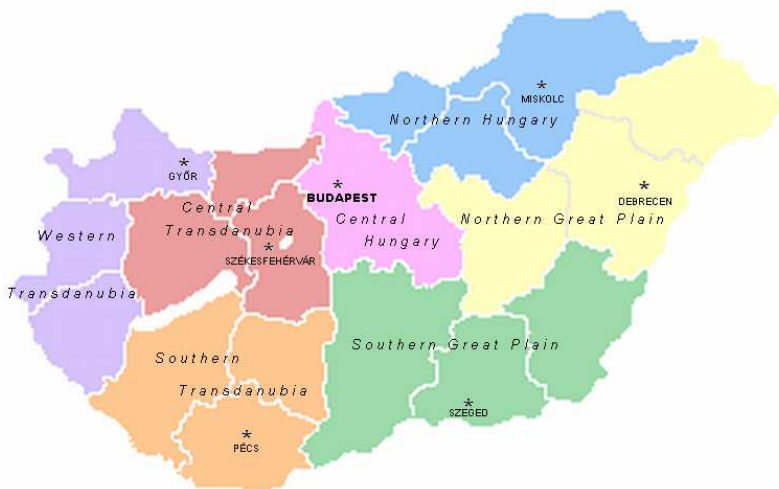
regions by infrastructural investment and by measures that enhance economic competitiveness. The Cohesion Fund's objective is to alleviate economic and social inequality and the promotion of sustainable development (*Net2*).

The European Regional Development Fund and the European Social Fund of the Structural Funds support the following objectives:

1. support the development and structural adjustment of underdeveloped areas
2. supporting economic and social conversion of regions facing structural difficulties
3. development of human resource management, reducing long-term unemployment, modernization of education, vocational training and employment systems and policies (ESF) (*Flamm-Nagy, 2003*)

A key condition for receiving funding from the Structural Funds is the use of the NUTS (Nomenclature des Unites Statistiques territoriales) rating system. The NUTS initially had five rates based on statistical and spatial data, currently there are three defined levels. In Hungary, the NUTS level 1 consists of parts of the country: Transdanubia, Central Hungary and Northern Plain and North. The NUTS level 2 corresponds to the statistical regions, while at the NUTS 3 level the county system is located. In Hungary in 1998 seven NUTS level 2 regions were assigned, which are (*figure 1.*)

- Western Transdanubia
- Central Transdanubia
- Southern Transdanubia
- Central Hungary
- Northern Hungary
- Northern Great Plain
- Southern Great Plain



Source: <https://upload.wikimedia.org/wikipedia/commons/1/16/RegionsHungary.png> (Net3)

Figure 1 Hungary's Regions (Net4)

The LAU level 1 (formerly NUTS 4) contains 175 statistical micro-regions and at LAU 2 level (formerly NUTS 5) 3152 settlements are located. The classification entitles Hungary to use EU funds. However, receiving the funds has rigorous financial, administrative and organizational regulations.

1.2. Domestic use of EU subsidies

The European Union member states have to prepare a National Development Plan, which provides information about for what purpose, what area the Member State uses the grant. Another objective of the National Development Plan is to draw up a comprehensive national strategy based on the country's resources. The National Development Plans contain operational programs that determine development areas supported by grant and the detailed rules of the use of resources.

Hungary's first National Development Plan (NDP I) covered the period from 2004 to 2006 and included five operational programs. Hungary's second National Development Plan bears the name of the New Hungary Development Plan and regulated the use of EU subsidies for the 2007-2013 period in 15 operational programs (it contained the regional operational programs separately). The distribution of funds to be used during the period 2014-2020 is controlled by Széchenyi 2020 program and adjusts to the European Union's 11 thematic objectives (*Table 1*).

The extent of European Union subsidies depends on the nature, aspects and socio-economic characteristics of the problem to be supported, the financial capacity of the Member State, the importance of the support from regional and EU perspective and the specific characteristics of the activity (*Flamm-Nagy, 2003*).

Table 1: Distribution of cohesion policy funds among Member States in the 2014-2020 programming period (EUR million)

Total ESIF allocations 2014-2020* (million €, current prices)											
	Cohesion Fund	Less Developed Regions	Transition Regions	More Developed Regions	Outermost and northern sparsely populated regions	European Territorial Cooperation		Youth Employment Initiative (additional allocation)	Rural Development	EMFF	Total
						Cross-Border Cooperation	Transnational Cooperation				
BE	-	-	1 039,7	938,6	-	219,0	44,2	42,4	551,8	41,7	2 877,5
BG	2 278,3	5 089,3	-	-	-	134,2	31,5	55,2	2 338,8	88,1	10 015,3
CZ	6 258,9	15 282,5	-	88,2	-	296,7	43,0	13,6	2 170,3	31,1	24 184,3
DK	-	-	71,4	255,1	-	204,2	22,7	-	629,4	208,4	1 391,1
DE	-	-	9 771,5	8 498,0	-	626,7	338,7	-	8 217,9	219,6	27 672,3
EE	1 073,3	2 461,2	-	-	-	49,9	5,5	-	725,9	101,0	4 416,8
IE	-	-	-	951,6	-	150,5	18,3	68,1	2 190,0	147,6	3 526,1
EL	3 250,2	7 034,2	2 306,1	2 528,2	-	185,3	46,4	171,5	4 196,0	388,8	20 106,6
ES	-	2 040,4	13 399,5	11 074,4	484,1	430,0	187,6	943,5	8 290,8	1 161,6	38 011,9
FR	-	3 407,8	4 253,3	6 348,5	443,3	824,7	264,6	310,2	9 909,7	588,0	26 350,2
HR	2 559,5	5 837,5	-	-	-	127,8	18,3	66,2	2 325,2	252,6	11 187,2
IT	-	22 324,6	1 102,0	7 692,2	-	890,0	246,7	567,5	10 429,7	537,3	48 790,0
CY	269,5	-	-	421,8	-	29,5	3,3	11,6	132,2	39,7	907,6
LV	1 349,4	3 039,8	-	-	-	84,3	9,3	29,0	969,0	139,8	5 620,6
LT	2 048,9	4 628,7	-	-	-	99,9	13,9	31,8	1 613,1	63,4	8 499,6
LU	-	-	-	39,6	-	18,2	2,0	-	100,6	-	160,3
HU	6 025,4	15 005,2	-	463,7	-	320,4	41,4	49,8	3 455,3	39,1	25 400,3
MT	217,7	-	490,2	-	-	15,3	1,7	-	99,0	22,6	846,6
NL	-	-	-	1 014,6	-	321,8	67,9	-	607,3	101,5	2 113,1
AT	-	-	72,3	906,0	-	222,9	34,4	-	3 937,6	7,0	5 180,2
PL	23 208,0	51 168,6	-	2 242,4	-	543,2	157,3	252,4	10 941,2	531,2	89 039,4
PT	2 861,7	16 671,2	257,6	1 275,5	115,7	78,6	43,8	160,8	4 057,8	392,5	25 915,3
RO	6 935,0	15 058,8	-	441,3	-	364,0	88,7	106,0	8 015,7	168,4	31 177,9
SI	895,4	1 260,0	-	847,3	-	54,5	8,4	9,2	837,8	24,8	3 937,4
SK	4 168,3	9 483,7	-	44,2	-	201,1	22,3	72,2	1 890,2	15,8	15 897,7
FI	-	-	-	999,1	305,3	139,4	21,9	-	2 380,4	74,4	3 920,6
SE	-	-	-	1 512,4	206,9	304,2	38,1	44,2	1 745,3	120,2	3 971,2
UK	-	2 383,2	2 617,4	5 767,6	-	612,3	253,3	206,1	2 580,2	243,1	14 663,2
Interregional cooperation											571,6
Urban innovative actions											371,9
Technical assistance									238,9		1 456,5
EU28	63 399,7	182 171,8	35 381,1	54 350,5	1 555,4	7 548,4	2 075,0	3 211,2	95 577,1	5 749,3	453 180,6

* breakdown by category of allocations subject to transfers between categories at the request of the Member States
 Note : totals excluding the transfers to Connecting Europe Facility and the Fund for European aid to the most deprived

Source: Own compilation based on http://ec.europa.eu/regional_policy/ru/funding/available-budget (Net5)

1.3. Tendering

The EU funds can be obtained through tenders, of which one condition is the consistency with the European Union's policies and objectives. Besides, the ways and means of how to win the tenders should be recognized. In addition to the technical knowledge (preparation of tender application) and specialized knowledge (EU legislation, goals, etc.) there is a need for a less specific, but important skills; *learning the European Union thinking.*

In project preparation and implementation the following EU principles are needed to be displayed, of which knowledge is desirable by every person concerned:

- partnership (to ensure the widest possible socio-economic participation in the project)
- programming (compliance with the regulatory process of the implementation of EU support goals)
- additionality (refers to the complementarity of subsidies)
- co-financing (own funds)
- concentration (the funds can be used for limited purposes)
- compatibility (consistency of the Union's and Funds' objectives)

Besides the rules listed, it would be advisable for all concerned with the implementation of (EU) projects to obtain an understanding of the effectiveness, "the success" of projects for the efficient, "successful" use of resources. This idea is supported by the words of József Kunos and István Telegdy. "The grant is not donation, but contributions from business organizations, citizens of the developed countries through the governments of the member states in a system severely sanctioned by the European economic community that the European Union provides for specified development purposes for underdeveloped countries/regions/beneficiaries" (*Telegdy-Kunos, 2003*). If we consider European Union's subsidies in this way, their effective, "successful" use is not only an objective, but also a duty.

1.4. Questions, assumptions

There is a positive correlation between the efficiency of projects and the effectiveness of the implementing organizations, since the efficiency of the tenders depends not only on the efficiency of project owners, but also on the efficiency of the complex application system. The effectiveness of the implementation of projects is a highly complex question, which assumes both the competency of the

implementing organizations and the effectiveness of the funding organizations. Effective project implementers are prepared to manage not only the internal, but also the external implementation risks.

My research aims to answer the following questions:

- Can the project efficiency/success factors of the EU-funded projects in the public sector be determined in general and during various project cycles?
- Is it possible to form input/output indicators based on factors indicating project efficiency?
- Can measurements be done by the Data Envelopment Analysis method based on the indicators thus formed?
- How can the research results be utilized in the implementation of EU-funded projects in the public sector?

The questions raised have contributed to the creation of **two hypotheses**:

- 1. The project efficiency (indirectly success) signalling factors in the EU-funded projects in the public sector can be determined in general and in the various project cycles.**
- 2. Measurements by the Data Envelopment Analysis method contribute to the efficient implementation of EU-funded projects in the public sector.**

The definition of public sector is ambiguous; I understand public sector organizations satisfying public needs by EU projects public sector implementers (*Dinya, 2000*).

Measurements were performed using an electronic questionnaire and the Data Envelopment Analysis (DEA) method during my research in EU-funded grant scheme to determine the efficiency factors of projects implemented by the public sector and for measuring efficiency. I mean the production of the desired outputs from the available inputs by efficiency in the research. After analysing the measured data, I was able to draw conclusions about the factors indicating project efficiency and the utilization of the results.

2. MATERIALS AND METHODS

2.1. Data collection

The participants of the implementation of European Union funded public sector projects were divided into four groups.

1. **The project owner** (the representative of the institution submitting the tender, has a contractual relationship with the supporter)
2. **The project management** (people managing the implementation of the project, has a contractual relationship with the project owner)
3. **The supporter** (a person acting as an intermediate body, managing authority in the implementation of the project, has a contractual relationship with the project owner, an employee of a central government body)
4. **The monitor** (coordinates, supports the implementation of the project according to job responsibilities, an employee of central government body, has a contractual relationship with the supporter)

The reason for and the justification of the four-team selection is that the groups are connected by content and institutions and their job activities are related to the efficient implementation of projects.

The same questionnaire containing open questions was sent electronically at a time to the members of groups involved in project implementation. The questionnaire-based data collection proved to be a practical tool of the research. First, the respondent had relevant time available to answer the questions; secondly, anonymity gave the opportunity to formulate their own opinions, too. Processing answers to open questions is more complex and time-consuming than processing answers to closed questions. However, the respondents' competence provided an opportunity to develop a definition of efficiency factors instead of pre-recorded wordings.

The answers to the following questions provided data for the analysis of the research topic:

1. **Based on your job function and your job experience so far how would you define the efficiency of EU-funded projects in general?** ("when is the EU project efficient?", definition)
2. **List at least three factors per sub point that are suitable to identify the efficiency of EU-funded projects in terms of your job function**
 - a. **at the beginning of the project cycle (from tender submission to the completion of the preparatory activities):** (At the beginning of the project cycle the EU project is efficient, if ...)
 - b. **in the middle of the project cycle (from the start of the implementation to the physical/financial closing of the project):** (in the middle of the project cycle the EU project is efficient, if ...)
 - c. **at the end of the project cycle (at the physical/financial closing of the project):** (at the end of the project cycle the EU project is efficient, if,...)
 - d. **in the maintenance period of the project:** (in the maintenance period of the project the EU project is efficient, if...)
3. **In terms of your job function why would it be useful to identify the efficiency factors of EU projects during the project cycles** (if it were not useful, please also indicate and explain briefly).

Data availability significantly affected the test subject and the number of persons surveyed. The number of people involved was determined taking into account the sufficiency and necessity of the database. The four groups work in the same regulatory environment, which contributes to the unified management of the measured data. The purpose of my research was to carry out a real test based on the actual situation rather than data generation.

The highlighted importance of the data obtained from the responses is that it is comparable to the real situation and demonstrably relevant to the study. Interesting findings can arise in terms of the affected people's perception of project efficiency. Another objective of the research was the **identification of new efficiency factors**, what the open survey data collection made possible.

The relatively small (50 people) target group was suitable for the testing of the questionnaire. If the questionnaire is appropriate, its wider application is necessary. After the evaluation of the questionnaires at a later stage of the research closed-question (selective or scale) questionnaire-based data collection can be considered.

Based on the survey I received responses to the following questions of my research:

- Can the project efficiency/success factors of the EU-funded projects in the public sector be determined in general and during the various project cycles?
- Is it possible to form input/output indicators based on factors indicating project efficiency?
- Can measurements be done by the Data Envelopment Analysis method based on the indicators thus formed?

2.2. Methodological description of Data Envelopment Analysis

I was looking for the answer to the fourth question (How can the research results be utilized in the implementation of EU-funded projects in the public sector?) by using the relative efficiency measurement. The method was developed by Charnes, Cooper and Rhodes in 1978 with the intention to make the measurement of decision efficiency possible, especially in state programs.

The Data Envelopment Analysis (DEA) method allows the relative efficiency measurement of organizations performing the same or similar activities, departments or any other decision-making units (decision making units=DMUs). The decision-making units need to have some level of discretion (not necessarily full). It will be

established which organizations/departments are efficient and which are not efficient enough. For the measurement input-and output indicators are needed to be determined.

- **An input** is all resource of which used quantity the departments themselves decide on.
- Under **output** I understand the operating result on which behalf the organizational units invest resources in (*Koltai, 2013*).

After completing the measurements, the units can be divided into two groups:

- Non efficient: The decision-making units than which there are other better performing units with regard to all outputs, in no way can be regarded as efficient.
- Efficient: Some of the other decision making units designate an efficiency limit illustrated in an input-output coordinate system or envelopment (to this refers the English name of the method as well). The efficient are located on this "boundary" (*Somogyi, 2011*).

The advantage of the Data Envelopment Analysis method is that the input and output indicators used to test decision-making units can have a completely different unit of measurement and they are dimension free; the person carrying out the measurements can determine them freely, thereby allowing a direct comparison of the relative efficiency. The feature that really makes the method suitable for measuring project implementation participants' efficiency is that it allows the measurement of units where there is no launched product or service, but they carry out administrative activities.

3. Results

During my research I **determined, systematized and analysed the efficiency factors** of EU-funded projects in the public sector for in general and in the various project cycles.

I compared the most often mentioned overall efficiency factors of projects with efficiency factors considered the most important in the various project cycles. (*Table 2*)

Table 2: Efficiency factors

	In general	At the beginning of the project cycle	During implementation	At the end of the project cycle	During maintenance
1	Cost efficiency	Proper planning	Project aims retention	Project goals are met	Project results maintenance
2	Achieving the planned results	Efficient procurement/ Cost efficiency/ Efficiency of project participants	Compliance with schedule	Successful clearance	Project goals are met
3	Project results sustainability	Compliance with schedule	Compliance with budget	The use of the awarded grant	Utilization of project results

Source: Own compilation

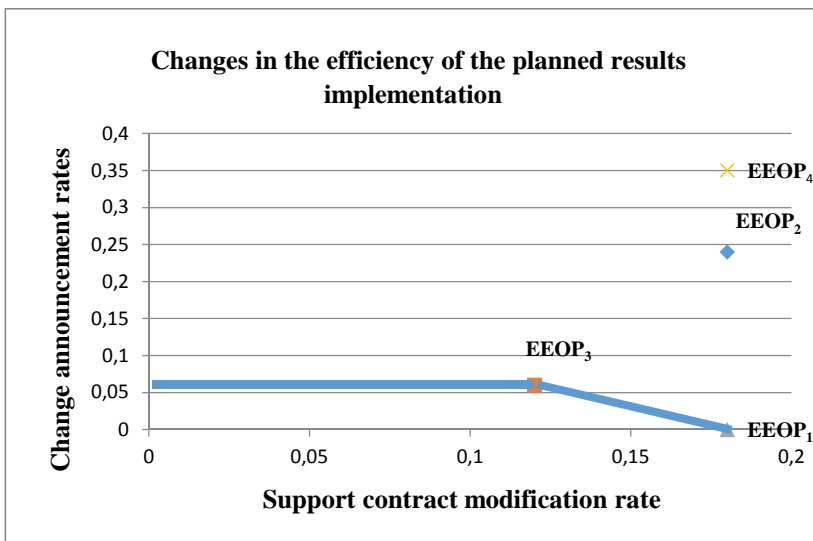
I determined input and output indicators necessary to carry out constant scaled relative efficiency measurements (*Table 3*). I examined the applicability of the Data Envelopment Analysis method in the context of the research. Project participants can use the model in their everyday work without complex mathematical calculations. The method makes it possible to carry out complex investigations by mathematical programming models.

Table 3: Efficiency indicators

Efficiency indicators	Output indicator	Input indicator
Cost efficiency	Number of fulfilled indicators	The salary / remuneration of decision-making units
Achieving the planned results	Number of changes	The amount of time spent on implementation
Project results sustainability	Number of reserved indicators	The cost of maintaining indicators
Real demand service	The number of satisfied output users	The cost of maintaining outputs
Positive social impact of project results	The social indicator	The cost of the social indicator
Consistency with the European Union's support policy objectives	Number of support policy-driven outputs	The cost of matching outputs
Consistency with national support policy	The number of development fitting outputs	The cost of matching outputs
Measurability of complex impact	The number of complex indicators	Human resources participating in achieving the effect
Meeting tender goals	The number of common tender indicators	Cost of implementation
Resource is used	Number of fulfilled indicators	The amount of used resources
Orderly implementation	The number of irregularity procedures	The number of human resources involved in the procedure
Meeting schedule	Number of fulfilled indicators	The amount of time spent on performance
Meeting organizational goals	Number of common strategic goals	Money spent on fulfilling the goals
The organization's employees find it useful	Number of satisfied employees	Cost of implementation
There are few supporter-project owner consultations	Number of consultations	Time spent on consultations
Use of resources according to market criteria	The amount of output required by contract	The average market price of output production
The satisfaction of target groups	The number of satisfied target group members	Cost of implementation

Source: Own compilation

I tested the relative efficiency measurement with the help of input and output indicators determined by me. Based on the calculations projects were classified into efficient and non-efficient categories and efficiency was depicted graphically (Figure 2.).



Source: Own compilation

EEOP= Environment and Energy Operative Program

Figure 2 Changes in the efficiency of the planned results implementation

4. New results of the dissertation

1. During my research, I have **determined, systematized and analysed the efficiency factors of EU-funded projects in the public sector for projects in general and in the various project cycles.**
2. **I have determined input and output indicators necessary to carry out constant scaled relative efficiency measurements.** I have examined the applicability of the Data Envelopment Analysis method. Project participants can use the model in their everyday work without complex mathematical calculations.
3. **I have tested the relative efficiency measurement with the help of input and output indicators determined by me.** Based on the calculations, projects have been classified into efficient and non-efficient groups. The measurements mathematically justify the objective efficiency assessment of projects.
4. **I have determined five new efficiency factors for the measurement of EU-funded public sector projects.**

4.1. The use of resources according to market criteria, that is, (public) procurement was in line with market prices, the duration of the implementation and the results of the project are in line with market expectations. This efficiency factor indicates that there is a difference between EU projects implemented by the public sector and projects implemented by the market in terms of time, cost and quality.

4.2. Efficient project operators who "actually know the project" and are efficient separately or together in each project cycle. I have recognised that all stakeholders' effective and coordinated activities contribute to the efficiency assessment of projects.

4.3. Efficient public procurement, which means, that in addition to the timely procurement procedures their efficiency also have come to the fore, that is, the orderliness of the procedure, the consistency of its technical content with project objectives have been identified as an efficiency-affecting factor.

4.4 A successful final report and accounting have been identified as the second most important efficiency factor at the end of the project cycle, which has also been shown for the first time in this cycle. This indicates that this factor is typical only to this phase of the project and the efficiency of the cycle can be measured by it.

4.5. Meeting horizontal commitments identified as a new efficiency factor is justified by the European Union regulation, too. Equal opportunities and sustainable development prevailed in the New Hungary Development Plan, the National Reform Programme, as well as in the design of the operational programmes and prevail in the institutional system of the implementation.

5. **I have surveyed factors determining the efficiency of EU-funded public sector projects and I have revealed their context with project actors involved in the research.** I have concluded that the assessment of efficiency is relative; it depends on people judging efficiency, their job function and their activities carried out in projects.
6. **I have justified that project cycles are well separated in terms of efficiency assessment and can be measured separately.** The efficiency factors of project cycle are not the same as factors describing project efficiency as a whole.
7. **I have created the concept of relative and absolute project efficiency.** The relative project efficiency designates efficient projects in terms of each indicator, while the absolute project efficiency informs about the fulfilment of all efficiency factors simultaneously.

5. The practical use of the results

1. I have applied the practical application of research results to the implementation of the European Union-funded public sector projects and systematized according to project participants.

According to **the project owner** group knowing efficiency factors increases schedulability and predictability, results in a better cooperation among project actors, improves project implementers' prestige and they learn about efficiency expectations. It promotes project monitoring, project management's work and absorption.

Based on **the project management group's** answers if we know efficiency factors we can inform on project actors' efficiency, project implementation becomes controllable, "non efficiency" factors can be minimized, it will result in good project content, more projects will be realized at market price, as well as risks and opportunities will be identified.

The **supporter group** stated that knowing the results of the research increases tender efficiency, results in more efficient work and a more objective support system, project actors know about expectations, promotes identifying risks and a more efficient distribution of resources, absorption increases and results and impact can be monitored.

The **monitoring group** found useful to know the factors because project actors' efficiency becomes measurable, it facilitates preliminary, intermediate- and post implementation review, promotes identifying risks, the fulfilment of the commitments can be monitored and utilization can be measured objectively.

2. Knowing efficiency factors promotes the implementation of the EU-funded public sector projects, contributes to their more efficient **planning, controllability, monitoring and evaluation.**
3. Based on the data of relative efficiency measurements done on the efficiency factors **analysis can be performed both to increase the output and to reduce the input** and by the use of the model mathematically objective decisions can be made on issues relating to the institutional system of development policy.
4. Project actors involved in the research have indirectly formulated expectations towards each other, which thus became **the group's efficiency factors** at the same time. The so formulated efficiency requirements become apparent and accountable by all actors involved in the project.

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- Net3:* <http://wellnessfarm.hu/kereso/regiok/regiok.png>
- Net4: "Regions Hungary".* Licensed under Creative Commons Attribution-Share Alike 3.0 via Wikimedia Commons

<http://commons.wikimedia.org/wiki/File:RegionsHungary.png#mediaviewer/File:RegionsHungary.png>

Net5: A kohéziós politikai alapok tagállamok közötti eloszlása a 2014-2020 programozási időszakban

http://ec.europa.eu/regional_policy/hu/funding/available-budget/

7. PUBLICATION RELATED TO THE DISSERTATION



DEBRECENI EGYETEM
EGYETEMI ÉS NEMZETI KÖNYVTÁR



Nyilvántartási szám: DEENK/222/2015.PL
Tárgy: PhD Publikációs Lista

Jelölt: Siposné Sinóros-Szabó Laura
Neptun kód: F79IYQ
Doktori Iskola: Kerpely Kálmán Doktori Iskola
MTMT azonosító: 10051535

A PhD értekezés alapjául szolgáló közlemények

Magyar nyelvű könyvrészlet(ek) (2)

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Magyar nyelvű tudományos közlemény(ek) hazai folyóiratban (2)

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