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IMPLEMENTING DIFFERENT TYPES OF DATA IN ECONOMIC APPLICATION

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Abstract: *The paper presents the implementation of different types of data in economic application. The management information system ensures the obtaining and provision of the information requested by the user, using IT means, to substantiate the decisions regarding a certain field within the company. Current management information systems are integrated systems. They are characterized by the application of the principle of single data entry and multiple processing in accordance with the specific information needs of each user. The integrated IT Accounting System is characterized by a unique data entry, taken from primary documents that update a single accounting database that will be subsequently exploited to ensure both specific works of financial accounting and those specific to management accounting responding - thus the processing requirements of all users. An information system is an intercorrelated set of IT subsystems designed to manage the human, material and financial resources of a company or public institution. Information systems are open systems, which work closely with the company's partners (customers, suppliers, public institutions and financial-banking organizations). Inhomogeneous data is present in every company, so the information systems need to integrate those into different types of structures and objects that are implemented in modules specific to business flows. On-line applications need automated processes that will extract transform and load inhomogeneous data provided by current transactions that appear in every day operations, so the appropriate way to use these data is to load them into data structures that can be implemented into many business applications.*

Keywords: *data structures, data graphs, data trees, economical data, information processes, business flows, application modules, anlysis of data, data algorithms*
JEL Classification: *C23, C26, C38, C55, C81, C87*

1. Introduction

The architecture of the information system represents the generic solution regarding the data processing processes that must be performed and the way of integrating the data and processing. In other words, architecture is the „constructive solution" of the IT system and reflects the strategic managerial vision of how the organization (company) works.

The company's global IT system is broken down into subsystems, each of which covers a distinct field of activity. In turn, each subsystem is broken down into applications, each covering a distinct activity within the field. For example, the IT subsystem for the commercial field will be broken down into distinct applications for each of the following activities: supply, sales, marketing. The decomposition process continues and in the next step for each application will be defined procedures performing distinct functions within the application (example: procedures for directing processing, procedures for updating the database, procedures for consulting the database).

In turn, the procedures are broken down into modules. These comprise code sequences performing a distinct function within the procedure. For example, a database update procedure will include: a module for adding records, a module for modifying records, a module for deleting records.

Data are facts collected from the real world based on observations and measurements. They are any message received from a receiver in a certain form. Data in automatic data processing terminology is defined as a model for representing information in a computer-accessible format. From a logical point of view, the date is defined by: identifier, attribute and value. The data collection is a set of data organized according to certain criteria (Subero, 2021; Edappanavar, 2019).

Data structures are data collections between which a series of relationships have been established that lead to a certain mechanism for selecting and identifying its components.

Depending on the storage medium, the data structures can be:

- in the internal memory of the computer (during data processing), defined by the notions: list, queue, stack;
- on storage media for further processing, defined by: file and database.

An efficient data structure that can do the following operations as quickly as possible: Insert, Search and Delete. The idea behind hashing is to store an item in a table or list, depending on its key. On average, all these operations require one (1) time.

The elements are placed in a statically allocated array on their key positions. By direct addressing, an element with the key k will be stored in location k. All 3 operations are extremely simple (requires only a memory access), but the disadvantage is that this technique „eats" a lot of memory: O (| U |), where U is the universe of keys (Subero, 2021; Nilsson, 2020).

2. The hash table used to store and model data in applications

Search algorithms that use hashes consist of two distinct parts. The first part is to calculate a hash function that turns the search key into a table address. Ideally, different keys would map to different addresses, but often two or more different keys can be distributed to the same table address. The second part of a search algorithm that uses hashing is a collision resolution process. One of the methods of resolving collisions that we will study uses chained lists, and is therefore immediately usable in dynamic situations where the number of search keys is difficult to predict in advance.

Hashing is a good example of a space-time compromise. If there is no memory limitation, then we could do any search with just a memory access simply by using the key as a memory address, just like in indexed search. This ideal often cannot be achieved because the amount of memory required is prohibitive when the keys are long. On the other hand, if there were no time limit, then we could get the answer with only a minimal amount of memory using a sequential search method.

Hashing provides a way to use both a reasonable amount of memory and time to keep a balance between these two extremes. In particular, we can achieve any balance we choose, simply by adjusting the size of the hash table, not by rewriting the code or choosing different algorithms (Edappanavar, 2019; Rana, 2021).

Hashing is a classic problem in computer science: the various algorithms have been thoroughly studied and are widely used. We will see that, based on generous assumptions, it is not unreasonable to expect search and insertion operations in the symbol table to take place in constant time, regardless of the size of the table. This expectation is the theoretically optimal performance for any implementation of the symbol table, but hashing is not a universal panacea, for two main reasons:

- driving time depends on the length of the key, which can be a responsibility in practical applications with long keys.
- hash does not provide efficient implementations for other symbol table operations, such as select or sort.

The first step in solving the memory problem is to use O (N) memory instead of O (| U |), where N is the number of elements added to the hash. What we need to address is the calculation of the hashing function, which turns the keys into table addresses.

Thus, an element with the key k will not be stored in the location k, but in h (k), where h: U -> {0, 1, ..., N-1} - a randomly chosen but deterministic function (h (x) will always return the same value for a given x while running a program). This arithmetic calculation is normally simple to implement, but care must be taken to avoid the various subtle pitfalls.

The hashing function depends on the key type. Strictly speaking, we need a different hashing function for each type of key that could be used. For efficiency, explicit conversion is generally avoided, striving instead for a return to the idea of considering the binary representation of the key in a machine word as a whole that we can use for arithmetic calculations. It was a common practice on early computers to see a key value at one time as a string and at another as a whole (Subero, 2021; Schilasky, 2020).

In some high-level languages it is difficult to write programs that depend on how the keys are represented on a particular computer, because such programs, by their nature, are machine-dependent and therefore not portable. The hash functions are generally dependent on the process of transforming the key into integers, so the independence and efficiency of the machine are sometimes difficult to achieve simultaneously in hashing implementations. We can usually turn simple whole keys or floating point keys with just one machine operation, but string keys and other types of compound keys require more attention and more attention to efficiency (Schilasky, 2020; Edappanavar, 2019).

Key transformation methods:

- String variables can be converted to numbers in base 256 by replacing each character with its ASCII code.
- Data type variables can be converted to integers by the formula: X = A * 366 + L * 31 + Z where A, L and Z are respectively the year, month and day of the considered date. In fact, this function approximates the number of days elapsed since the beginning of the 1st century.
- Analogue, hour variables can be converted to integers with the formula: X = (H * 60 + M) * 60 + S where H, M and S are respectively the hour, minute and second considered, or with the formula X = ((H * 60 + M)

* 60 + S) * 100 if hundreds of seconds are taken into account. This time, the function is surjective (any integer in the range 0 - 8,639,999 uniquely corresponds to one hour).

- In most cases, data are structures that contain numbers and strings. A good conversion method is to paste all this data and convert it to base 256. The characters are converted by simply replacing them with the corresponding ASCII code, and the numbers by converting to base 2 and cutting into "pieces" of eight bit. The result is multi-digit numbers (too many even for the long long type), which are subjected to a division operation with remainder. How? Why? Simplified example: Suppose we have a table with 101 positions and the key AKEY = 00001 01011 00101 11001 (5-bit code) = 4421710 ≡80 (mode 101) Base 32 (signs) => AKEY = $1 * 32^3 + 11 * 32^2 + 5 * 32^1 + 25 * 32^0$

Very often used scattering functions 1. Subtraction method The hash function is: h (x) = x mode M where M is the number of entries in the table. The problem is to choose M as best as possible, so that the number of collisions for any of the inputs is as small as possible. Also, M must be as large as possible, so that the average number of keys assigned to the same input is as small as possible. However, experience shows that not every value of M is good. The hash functions return a number between 0 and M-1, where M is the maximum size of the hash table. It is recommended that M be chosen as a prime number and avoid choosing $M = 2^k$.

Example 1:

Suppose we have a table with 32 positions and the key
Key1 = 00001 01011 00101 11001 (5-bit code) = 4421710 ≡80 (mode 101)

Base 32 (signs) =>

Key2 = $1 * 32^3 + 11 * 32^2 + 5 * 32^1 + 25 * 32^0$

But if

Key3 =

10110001011001011001011000111101110001110101100101110 01 =

$22 * 32^{10} + 5 * 32^9 + 18 * 32^8 + 25 * 32^7 + * 32^6 + 15 * 32^5 + 14 * 32^4 + 7 * 32^3 + 11 * 32^2 + 5 * 32^1 + 25$ = (((((((((22 * 32 + 5) 32 + 18) 32 + 25) 32 + 12) 32 + 15) 32 + 14) 32 + 7) 32 + 11) 32 + 5) 32 + 25 - the value of mod32 would always be the value of the last letter in the key.

Example 2:

For the same reasons, choosing a value like 1000 or 2000 is not very inspiring, because it only takes into account the last 3-4 digits of the decimal representation.

The method of multiplication

The hash function is h (x) = [M * {x * A}] 0 <A <1, and by {x * A} is meant the fractional part of x * A, ie x * A - [x * A].

Example:

If we choose M = 1278 and A = 0.3, and x = 2005, then we have h (x) = [1278 * {601.5}] = [1278 * 0.1] = 127. It is observed that the function h produces numbers between 0 and M- 1. Indeed $0 \leq \{x * A\} < 1$ $0 \leq M * \{x * A\} < M$.

The value of M is no longer very important. M can be as large as we like, possibly a power of 2. In practice, it has been observed that the dispersion is better for some values of A and worse for others;

If the chosen function behaves as close as possible to a random number generation, the elements will be "scattered" in the table evenly. For each input, each output should be in a certain sense, just as likely. Ideally, each item should be stored alone in its location. However, this is not possible, because N <| U | and, therefore, many times more items will be distributed in the same location. This phenomenon is called collision (Rana, 2021; Subero, 2021).

3. Methods of implementation for hash table data

Collision resolution methods:

- Chain
- Static lists
- Open addressing
- Double hashing

Chaining - In each position in the table we keep a chained list; insert, delete and search go through the whole list. In a purely theoretical case, all N elements could be distributed in the same location, but in practical cases the average length of the longest chain is lg (N). Variant: instead of the list, trees.

Improved version of the previous method: because the length of a chain is at most lg (N), we can use, instead of chained lists, dynamically allocated vectors of length lg (N) - or lg (N) + 3 - pointers are removed.

```
// implementation by adapting the procedures from the tables
// symbols for M static lists

#include <stdlib.h>
#include "Item.h"
typedef struct STnode* link;
struct STnode { Item item; link next; };
static link *heads, z;
static int N, M;

void STinit(int max)
{ int i;
N = 0; M = max/5;
heads = malloc(M*sizeof(link));
z = NEW(NULLitem, NULL);
for (i = 0; i < M; i++) heads[i] = z;
}
Item searchR(link t, Key v)
{
if (t== z) return NULLitem;
if (eq(key(t->item), v)) return t->item;
return searchR(t->next, v);
}
Item STsearch(Key v)
{ return searchR(heads[hash(v, M)], v); }

void STinsert(Item item)
{
int I = hash(key(item), M);
heads[i] = NEW(item, heads[i]); N++; }
 void STdelete(Item item)
int i = hash(key(item), M);
heads[i]= deleteR(heads[i], item);
}
```

By open addressing, all elements are stored in the scatter table. To perform the required operations, we successively check the scatter table until we either find a free location (in the case of Insert), or we find the searched item (for Search, Delete). However, instead of looking for the scatter table in the order of 0, 1, ..., N-1, the sequence of examined positions depends on the key to be inserted. To determine the appropriate locations, we extend the hashing function so that it also contains the check number as a second parameter h: U * {0, 1, ..., N-1} -> {0, 1, ... , N-1}.

Thus, when we insert an element, we first check the location h (k, 0), then h (k, 1) etc. When we get to check h (k, N) we can stop because the scatter table is full. We use the same method to search; if we reach h (k, N) or an empty position, it means that the element does not exist. However, deletions are made more difficult, because you cannot simply "delete" an element because

it would damage the entire dispersion table. Instead, mark the location to be deleted with a delte value and change the Insert function so that it sees the locations with the delete value as empty positions.

This implementation of a scatter table keeps the items in a table twice the length of the maximum number of items expected to be entered, items initialized with null values (NULL values).

To insert a new item, we calculate its position in the table, and if it is already occupied it looks to the right using the null macro to test if a position is occupied. To search for an item with a given key we calculate its position and then scan to find the match or stop if we have reached an unoccupied position (Nilsson, 2020; Schilasky, 2020).

The STinit function sets M so that we expect the table to be half full, so that the other operations need few tests if the hashing function produces values close to random values.

```
#include<stdio.h>
#include<conio.h>
void main() {
 int a[10] = { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 };
 int n, value;
 int temp, hash;

 clrscr();
 printf("\nEnter the value of n(table size):");
 scanf("%d", &n);
 do {
  printf("\nEnter the hash value");
  scanf("%d", &value);
  hash = value % n;
  if (a[hash] == 0) {
   a[hash] = value;
   printf("\na[%d]the value %d is stored", hash, value);
  } else {

   for (hash++; hash < n; hash++) {
    if (a[hash] == 0) {
     printf("Space is allocated give other value");
     a[hash] = value;
     printf("\n a[%d]the value %d is stored", hash, value);
     goto menu;
    }
   }

 for (hash = 0; hash < n; hash++) {
    if (a[hash] == 0) {
     printf("Space is allocated give other value");
```

```
      a[hash] = value;
      printf("\n a[%d]the value %d is stored", hash, value);
      goto menu;
     }
    }
    printf("\n\nERROR\n");
    printf("\nEnter '0' and press 'Enter key' twice to exit");

   }

   menu:

   printf("\n Enter more values?");
   scanf("%d", &temp);

 }
 while (temp == 1);
 getch();
}
```

Properties for hash tables:

- Separate chaining reduces the number of sequential search comparisons by an M factor (on average), using extra space for M chains.
- In a dispersion table that is less than 2/3 full open addressing requires less than 5 tests.

A big improvement on the scatter table is another scatter chart. We will have 2 tables, each with its own hashing function, and we solve collisions by chaining; when we insert an element, we will add it to the table where it falls into a shorter chain. The search is done in both tables in the locations returned by the 2 hashing functions; deleting as well. The length of the longest chain will be, on average, lg (lg (N)). In practice, the length of such a chain will not exceed 4 elements, because the smallest N for which lg (lg (N)) = 5. Instead of lists we use static vectors of size 32 (Khadda, 2020; Nilsson, 2021).

4. Conclusions

Economic application systems fulfill operational, managerial and strategic support roles in businesses and organizations, and can be grouped into information systems for enterprise functions, operational information systems and managerial information systems (Schilasky, 2020; Khadda, 2020). It is important for a manager to understand that economic applications directly supports the organization's operational and managerial functions in accounting, finance, human resources, marketing and operational management. Operational

economical processes data generated and used in business operations (Khadda 2020; Edappanavar, 2019). Depending on their role, there are several categories: transaction processing systems, record and process data resulting from transactions, update databases and produce a variety of documents and reports; process control systems that provide operational decisions that control physical processes; automated service systems for those that support communications. The mixed data existing in a company may be stored in different types of data, such as hash tables that optimize obsevational and series of values and so these can be processed through aptimal algorithms. An amount of many operations that are necessary upon structured data, make the storage in hash tables a good example of how to get quick results for better representation of economic facts that can change data flows in great access to various details.

References

Edappanavar, Shubham. (2019). *C++ Program to implement hash tables*, [online]. Available at: www.cppsecrets.com, https://cppsecrets.com/user/index.php?uid=665.

Khadda, Sanjay. (2020). *Hashtables chaining with doubly linked lists*, [online]. Available at: www.geeksforgeeks.org.

Nilsson, Per. (2020). *Introduction to hash tables*, [online]. Available at: https://www.codeguru.com/cpp/cpp/algorithms/hash/article.php/c5131/Introduction-to-Hash-Tables.htm.

Rana, Shubham. (2021). *C++ program for hashing with chaining,* [online]. Available at: https://www.geeksforgeeks.org/c-program-hashing-chaining/.

Schilasky, Rex. (2020). *Easy-to-use hash table,* [online]. Available at: https://www.codeguru.com/cpp/cpp/algorithms/hash/article.php/c5101/EasytoUse-Hash-Table.htm.

Subero, Armstrong. (2021). *The codeless guide to hashing and hash tables*, [online]. Available at: https://www.freecodecamp.org/news/the-codeless-guide-to-hash/.

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GREEN ENERGY PRODUCTION IN ROMANIA

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Abstract: *Green energy is the popular name for renewable and non-polluting energy sources. Electricity generated from renewable sources is becoming more and more available. By choosing such renewable energy sources, consumers can support the development of clean energy that will reduce the impact on the environment associated with conventional energy generation and increase energy independence (Tuttle, 1901). Moreover, when these technologies can help the consumer by reducing the bills for different utilities (water, heating) and by a short payback time in the case of domestic water heating systems, the installation of solar panels becomes an extremely profitable investment. in the case of household consumers, hotels, hospitals, etc. The choice of such sources reduces the impact that traditional energy has on the environment. This type of energy comes from resources such as sunlight, wind, rain, tides, waves and heat (Popescu, 1995). Photovoltaic and wind energy is an example of green energy, being a solution to replace traditional energy. Solar energy is consistent and continuous, it acts all year round and is distinguished by its ability to be used quickly by a large part of the rural or even urban population.*

Keywords: *green energy, sustainable development*

JEL Classification: *Q01, Q42, Q56*

1. Introduction

Renewable sources (wind energy, solar energy, hydropower, ocean energy, geothermal energy, biomass and biofuels) are alternatives to fossil fuels, which help reduce greenhouse gas emissions, diversify energy supply and reduce energy dependence. volatile and unreliable markets for fossil fuels, especially oil and gas (Negrei, 1995).

Wind energy is a source of renewable energy generated from wind power. The main advantage of wind energy is the zero emission of pollutants and greenhouse gases, due to the fact that no fuels burn. No waste is produced. Solar energy is available in huge quantities, is inexhaustible (at least for several billion years) and is environmentally friendly (Samuelson & Nordhaus, 2000). The means of capturing solar energy are not polluting and have no harmful effects on the atmosphere. In the case of the production of electricity through photovoltaic panels, the percentage of solar energy in the total energy produced in the world has increased more and more over time and as technology develops, solar energy will be used more and more. more. Solar energy is definitely an alternative, as is wind or marine energy.

2. Green energy production in Romania

It is increasingly clear that Romania has a huge potential for alternative energy and that the projects are feasible. However, the problems appear in the exploitation of this potential and in how the Romanian state understood to support green energy (Parvu & Stefan, 2002).

According to the latest available data, since April 2015, 3% of installed net power comes from solar energy, 15% wind energy, 31% hydropower, 18% from hydrocarbons, 26% from coal, and 7% from nuclear energy.

Romania has renewable energy production units with an installed capacity of over 4,500 MW, which is equivalent to almost a quarter of all units. Most of the renewable energy production capacities are represented by wind units. The government is currently supporting the production of energy from renewable sources through the green certificate system. Each producer receives from the state company Transelectrica, the operator of the national electricity transmission system, a certain number of green certificates for the energy it produces and delivers on the grid, and suppliers are obliged to purchase them to meet the mandatory quotas set for achieving the targets set at European level. Furthermore, suppliers (companies such as Enel, CEZ, GDF Suez) recover their costs from final consumers, both the population and the industry.

According to the initial support scheme, for each MWh of energy produced, two green certificates were granted in the wind field, three in micro-hydropower and six in the photovoltaic segment. The support scheme was amended by Emergency Ordinance 57/2013 (Constantinescu, 1976). Thus, by 2017, support for renewable energy will be limited: fewer green certificates will be issued for each technology (one green certificate for producers in the wind and microhydro sectors and two for those in the photovoltaic sector).

As reality has shown, the support scheme adopted by Romania is far from perfect. We mention here the investment bubble born from the race for green certificates, in which European energy giants implemented projects of tens and hundreds of megawatts, all in Dobrogea, connecting to the support scheme in question. From only 13MW of wind power capacity installed in 2009, the level reached 2800MW in 2014 (Popescu, 1995).

However, the sustainable development of the renewable energy sector means encouraging small-scale production, distributed throughout the country, as close as possible to the place of consumption. The way decisions have been made so far on the support scheme is a negative example of governance. The process of outlining it was opaque, with a minimum of consultation of those concerned and with decisions taken abruptly and unilaterally, to the exasperation of investors.

Establishing a system for the equitable promotion of renewable energy requires the initiation of a dialogue between the government, regulators, producer associations, municipalities and all other relevant actors. There have been voices - even numerous in recent years - who have claimed that renewables have gone wrong, in Romania, for various reasons - mainly economic and environmental. In our turn, we argue that in order to make things right, political will and action are needed, a message that we will address to decision-makers whenever it is needed to initiate change.

With currently available technologies, the consolidation of a generation system based only on renewable energy is becoming viable, not only to cover electricity demand but also total energy demand (example: heating and cooling) (Istrate & Bran, 1996). The serious environmental problems that obtaining energy generate require action on all possible fronts: as consumers we could bring about faster change by choosing clean energy.

Every year there are reports warning of the health and economic costs generated by air pollution caused by the energy sector. These costs can be avoided by adopting a common vision based on efficient and clean energy production alternatives (Popescu, 1995).

The new requirements in the field of sustainable development have determined the states of the world to question the methods of energy production and to increase the share of energy produced on the basis of renewable energies. The Kyoto Protocol commits the signatory states to reduce greenhouse gas emissions. This agreement led to the adoption of national policies for the development of wind turbines and other sources that do not emit carbon dioxide (Table 1).

Table 1. Main renewable technologies and their applications in the electricity, heating / cooling and transport sectors

Renewable technology	Energy conversion	Application
Hydroelectric power	From water flow and waterfalls in electricity	Electricity
Wind turbines	From wind energy to electricity	
Solar energy (photovoltaic and thermal - this includes concentrated solar energy)	From sunlight to electricity	
Biomass / biogas / bio liquids	From biomass / biogas / bio liquids to electricity	
Waste incineration	From waste to electricity	
Wave energy, tidal energy and other ocean energy	From the energy of waves and tides to electricity	
Geothermal energy	From temperature differences in electricity	
Solar thermal energy	From sunlight to heating and cooling	Heating and cooling
Biofuels / biogas	From biomass to liquid fuels or gases	
Waste incineration	From waste to heating and cooling	
Geothermal energy	From temperature differences in heating and cooling	
Biofuels / biogas	From biomass to liquid fuels or gases	transport

Source: https://op.europa.eu/webpub/eca/special-reports/wind-solar-power-generation-8-2019/ro/index.html

For the 2007-2013 and 2014-2020 programming periods, around € 8.8 billion has been allocated to renewable energy projects through cohesion policy funding from the European Regional Development Fund (ERDF) and the Cohesion Fund. As shown in Table 2, since 2007, investments in wind energy have been allocated approximately 972 million euros, and an amount of 2,868 million euros has been allocated for projects in the field of solar energy.

Table 2. ERDF and Cohesion Fund allocations for investments in renewable energy sources in the EU, 2007 2020, in EUR million

	2007-2013	2014-2020	Total	%
Wind power	**541**	**431**	**972**	**11 %**
Solar energy	**1 064**	**1 804**	**2 868**	**33 %**
biomass	**1 267**	**1 576**	**2 843**	**33 %**
Other renewable energy sources	**851**	**1 195**	**2 046**	**23 %**
Total renewable energy sources	**3 723**	**5 006**	**8 729**	**100 %**

Source: https://op.europa.eu/webpub/eca/special-reports/wind-solar-power-generation-8-2019/ro/index.html

In 2017, the share of renewable energy in the EU's gross final energy consumption reached 17.5%, the overall target for 2020 being 20%. This percentage was almost twice as high as in 2005 (9.1%). 11 of the 28 Member States have already reached their 2020 target (Gradinaru, 2001). These are: Bulgaria, the Czech Republic, Denmark, Estonia, Croatia, Italy, Lithuania, Hungary, Romania, Finland and Sweden. For the other 17 Member States:

- Greece, Latvia and Austria are most likely to reach their 2020 target if they continue to implement measures aimed at renewable energy sources at the current pace. These three states still need an increase of less than 2 percentage points (p. P.) In the share of energy from renewable sources by 2020;
- the share of renewable energy sources in eight other Member States (Belgium, Germany, Spain, Cyprus, Malta, Portugal, Slovenia and Slovakia) should increase by 2 4 p.p. for these countries to reach the 2020 target (in other words, the pace needs to be faster than before);
- the remaining six Member States are unlikely to meet their 2020 target, as they need the following increases in the share of renewable energy sources: the Netherlands - 7.4 pp, France - 6.7 pp, Ireland - 5 , 3 pp, United Kingdom - 4.8 pp, Luxembourg - 4.6 pp and Poland - 4.1 p.p.

3. The evolution of green energy production in Romania

The economic development of a country is largely dependent on creating and optimizing access to energy sources. Energy consumption is directly proportional

to the number of inhabitants, and with the population explosion, a greater number of resources is needed to cover the minimum necessary for consumers.

Energy security is, in short, the ability of a country to provide energy resources necessary for the well-being of the population, at stable prices. Currently, conventional methods of heating and lighting homes are not only endangered due to overload, but also harmful to the environment. And this phenomenon is beginning to make its presence felt in Romania as well. Globally, the energy sector has a massive effect on the environment, practically forcing the competent authorities to take measures to ensure a stable level of greenhouse gas emissions that are released into the atmosphere, but also the beginning of steps to reduce them in the near future (Istrate & Bran, 1996).

Given the current situation, which is far from ideal in most parts of the world, renewable energy is the number 1 substitute for this problem, being a viable solution to reduce the carbon footprint left in the atmosphere (Popescu, 1995).

In theory, the potential of renewable energy exceeds other types of energy, because it is unlimited and has no negative effects. Moreover, because 85.77% of the world's total energy consumption is represented by greenhouse gases, a radical change to renewable energy is not only welcome, but also mandatory for a greener future (Gradinaru, 2001).

Currently, in Romania, renewable energy constitutes 30% of the total percentage of energy used, although we have a high potential of renewable energy sources such as biomass, hydro or wind energy. From a statistical point of view, we are very good in this regard, already managing to reach the target of 25% renewable energy by 2020, much of this success being due to the consumption of hydropower.

We must also mention that the production of renewable energy in Romania is significant, ranking the country in second place in South-Eastern Europe, after Poland, and at a considerable distance from other European countries.

With an increase of only 3.1% between 2000 and 2016, the average established in Europe was not exceeded, but an increase of 7.8% can be observed between 2015 and 2016, which suggests an active involvement in the use of green energy in Romania in recent years.

At present, the production of renewable energy in Romania is 6550 ktoe, and a potential of 8000 ktoe remains untapped, but it can still be accessed in the future (Table 3).

Table 3. Evolution of energy production in Romania by categories (thousand kilowatts)

	1992	2000	2010	2015	2018	2019
Total, of which:	22177	21905	19911	23829	23553	20908
Termoelectrica	16442	15078	11637	11332	11115	8467
Hidroelectrica	5735	6120	6474	6638	6609	6595
Wind	0	0	389	3130	3032	3037
SOLAR	0	0	0	1318	1386	1398
Nuclear power	0	707	1411	1411	1411	1411

Source: Institutul Naţional de Statistică, Baza TEMPO on-line

Wind power

Due to its favorable geographical positioning, Romania has among the highest wind energy potentials in South-Eastern Europe, especially in areas such as Dobrogea, where wind turbines reach speeds of 7m / s at an altitude of 100 m. The above-mentioned potential can bring benefits for the future of wind energy in the country, estimating an additional generation of 23,000 GWh per year due to it. Romania is located in a temperate continental climate with high energy potential (~ 23 TWh estimated), especially in coastal and alpine areas.

In 2014, Dobrogea captured the largest amount of wind energy in Central and Eastern Europe, and in 2016, 23% of the total energy generated by Romania came from it. At the end of 2018, 16 more plants with a total capacity of 9.5 MW were installed, producing an average of 11.02 GWh per year.

Hydropower

Hydropower remains one of the most important sources of renewable energy, generating approximately 36 TWh per year and contributing 30% of the total energy stored in the network. Growing from year to year, there was an expansion of 10% between 2000 and 2016, and currently Romania has an installed capacity of 6.71 GW and an annual production of 1.25 Mote.

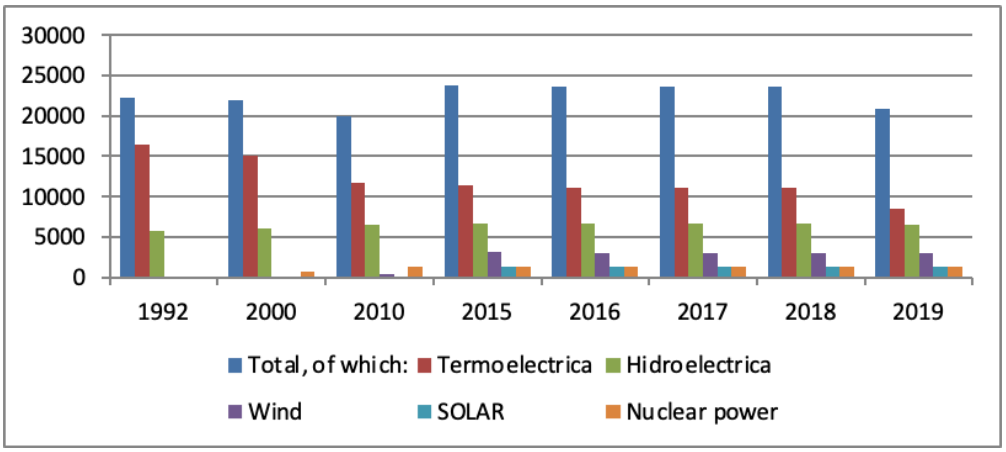
Solar energy

Romania has a substantial advantage from this point of view due to the favorable geographical position and the large number of sunny days per year, registering a significant progress in the previous years. Dobrogea, in particular, is an area where solar energy has taken a real lead. Of course, there are many other areas in the country where the number of solar panels installed continues to grow.

Of course, this is just the beginning! Storage capacity also saw an exponential increase between 2012 and 2016, increasing from 29 MW to 1300 MW in just 4 years according to the market analysis from Renewable Market Watch.

Analyzing the evolution of energy production by categories in the period 1992-2019, we see a massive decrease in the production of electricity produced in thermal power plants and an increase in other types of energy (Figure 1 and Table 4).

Figure 1. Energy production in Romania by categories (thousand kilowatts)



Source: National Institute of Statistics, TEMPO online base

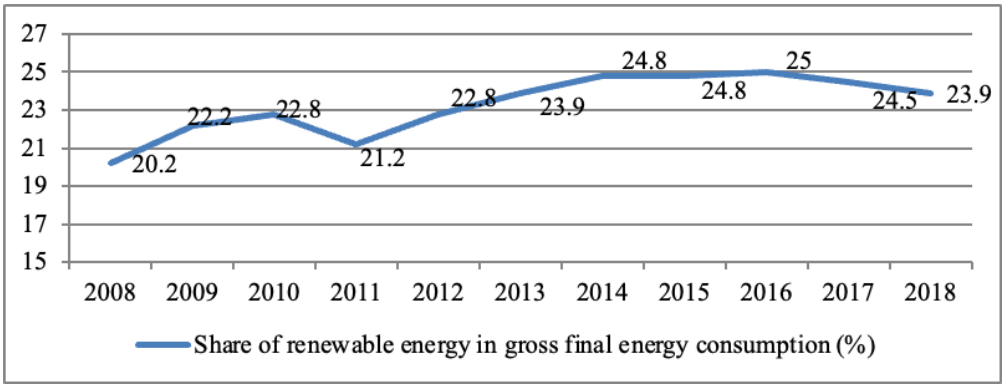
Table 4. Evolution of the share of energy production in Romania by categories (%)

	1992	2000	2010	2015	2018	2019
Termoelectrica	74,1	68,8	58,4	47,6	47,2	40,5
Hidroelectrica	25,9	27,9	32,5	27,9	28,1	31,5
Wind	0,0	0,0	2,0	13,1	12,9	14,5
SOLAR	0,0	0,0	0,0	5,5	5,9	6,7
Nuclear power	0,0	3,2	7,1	5,9	6,0	6,7

Source: National Institute of Statistics, TEMPO online base

Regarding the evolution of the share of renewable energy in the gross final energy consumption (Figure 2), we find that it had a sinuous evolution with increases and decreases in the period 2008-2018, the largest decrease being registered in 2011.

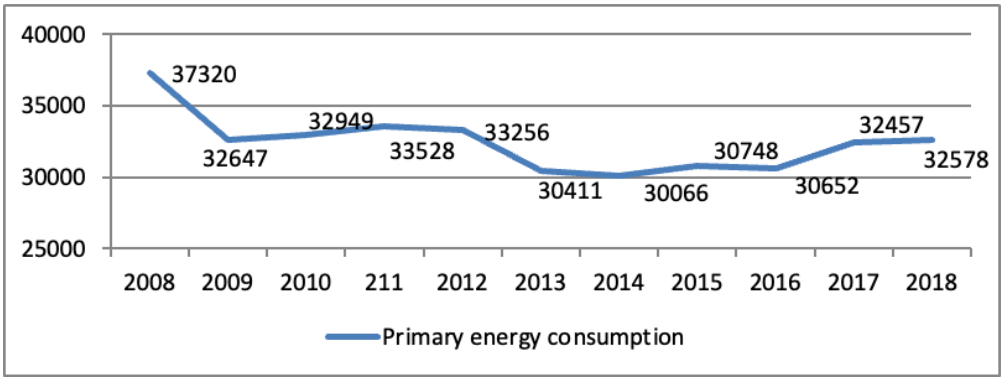
Figure 2. Evolution of the share of renewable energy in gross final energy consumption (%)



Source: National Institute of Statistics, TEMPO online base

The evolution of primary energy consumption in Romania (Figure 3) recorded decreases in the period 2008-2018, but these decreases were not spectacular, and from the evolution of the figures we conclude that our country is still dependent on primary energy sources.

Figure 3. Evolution of primary energy consumption in Romania (thousand tons)



Source: National Institute of Statistics, TEMPO online base

4. Conclusions

Renewable energies (also known as "green energies") are considered in practice, energies that come from sources that either regenerate themselves in a short time or are practically inexhaustible sources. The term renewable energy refers

to forms of energy produced by the energy transfer of energy resulting from naturally renewable processes. Thus, the energy of sunlight, winds, running water, biological processes and geothermal heat can be captured by humans using various processes (Popescu, 1995).

Non-renewable energy sources include nuclear energy as well as energy generated by burning fossil fuels, such as oil, coal and natural gas. These resources are obviously limited to the existence of those deposits and are generally considered (see the theory of Romanian academician Ludovic Mrazec of inorganic formation of crude oil and natural gas) non-renewable.

In December 2008, the EU adopted an ambitious and long-awaited package on „climate change and energy" which, among other things, obliges EU-27 countries to increase the share of renewable energy to 20% of Europe's total energy production by 2020 Being a clean and renewable source of electricity, wind energy is meant to make a significant contribution to achieving the 20% target (Gabor & Colombo, 1983).

In the last decade, wind energy has grown rapidly in Europe. In 2008, it accounted for about 4.8% of total EU electricity consumption. This percentage is expected to increase at least threefold by 2020. Therefore, it is clearly likely that the number of wind farms in the EU will increase considerably in the short and medium term. It is important to ensure that such rapid expansion is sustainable in all respects and that it is carried out in accordance with EU environmental law, including the Habitats and Birds Directives. Recent evidence indicates that, although wind energy is not generally a serious threat to wildlife, poorly located or designed wind farms can be a potential threat to vulnerable species and habitats, including those protected under the Habitats and Birds Directives (Samuelson & Nordhaus, 2000).

Romania has a huge potential in the green energy sector, which is largely latent. In recent years, 6 billion Euros have been invested for the development of the green energy sector in Romania and more than 45,000 MW have been built.

Given that the European Parliament has approved projects that require at least 35% of Europe's energy consumption to be from renewable energy sources by 2030, the situation in the energy sector will improve considerably (Bran, 1995). And Restart Energy wants to help as many consumers as possible realize the importance of switching to a green energy producer, from all points of view.

CEZ wind farm is the largest onshore wind farm in Europe, producing 1,323 GWh last year, 14% more than in 2016, benefiting from an average wind force of 7.25 m /s.

References

Bran, F. (1995). Protectia mediului inconjurator. *Tribuna Economica,* no 50, p. 6.

Constantinescu, N.N. (1976). *Economia protectiei mediului natura*l. Politica, Bucharest, p. 18.

Gabor, D. & Colombo, U. (1983). *Sa iesim din epoca risipei.* Politica, Bucharest, p. 36.

Gradinaru, I. (2001). Reglementari internationale privind criza mediului. *Tribuna Economica,* no 8, p. 30.

Institutul Naţional de Statistică, baza Tempo on-line.

Istrate, I, & Bran, F. (1996). Ecodezvoltarea – cerinta a lumii moderne. *Tribuna Economica,* no 38, pg. 64;

Negrei, C. (1995). Economia mediului. In *Bazele economiei mediului,* vol I, ASE, Bucharest, p. 155.

Parvu, V. & Stefan, V. (2002). Factorii de productie si utilizarea lor. In Gh. Pirvu (coordonator) *Economie*, cap. V, manual universitar, Universitaria, Craiova, p. 102.

Popescu, S. (1995). Eficienta economica in strategia dezvoltarii durabile. *Tribuna Economica,* no 46, p. 59.

Samuelson, P. & Nordhaus, W. (2000). *Economie*. Teora, Bucharest, p. 417.

Tuttle, C.A. (1901). The Fundamental Economic Principle. *Quarterly Journal of Economics,* Volume 15, Issue 2, February 1901, Pages 218–253, https://doi.org/10.2307/1884895, p. 218.

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NEW COMPANIES' FORMATION IN ROMANIA. A PVAR MODEL APPROACH

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Abstract: *This paper is an empirical analysis of determinants for new companies' formation and uses data from 42 Romanian counties (including Bucharest municipality) that belong to the 2010-2019 year interval. The exogenous here picked are found by the literature to be influential on new companies' formation. Results come out of a PVAR model applied (unrestricted vector autoregressive model applied on panel data). Granger causality results between regional GDP, unemployment rate, density of regional population, and entire entrepreneurial activity in Romania, on the one hand, and new companies' formation on the other, as endogenous. Stationarity and co-integration tests as well as lags criteria were done previously of estimating that PVAR model. All variables are found to be stationary of order one I(1), but test for co-integration was inconclusive. So, in absence of a certain co-integration, a VAR (and not a VECM) was chosen for estimations. Results confirm a relationship between almost all variables, tests for stability confirm that no root lies outside the unit circle and VAR satisfies the stability condition.*

Keywords: *new companies' formation, entrepreneurship, VAR model, panel data*
Jel Classification: *C3, C21, C23, M1, M13*

1. Introduction

This study aims to find some correlation and causal links between the formation of new companies in Romania at the regional level and some macroeconomic and regional variables here contributing to it. As similarly to some previous studies in the field, here the endogenous will be the formation of *new companies* at regional level and exogenous will be: unemployment rate, regional GDP, the size of existing entrepreneurship, specific population density and the number of immigrants (these are Romanian citizens, initially emigrating abroad, later returning to Romania, but this variable was then given up for reasons of non-stationarity.).

The determination links among these variables will be analysed in an auto-regressive vector model - VAR - on panel organized data for the 42 counties of Romania, here including Bucharest municipality, for the 2010-2019 years interval. Annual data come from INSSE (National Institute of Statistic) and ONRC(National Office of Company Registering) and , Eviews 10' program was used. Estimating a stable PVAR model - vector autoregressive on panel data - here helps to observe the impulse-response function and this is the one finding the reaction of the endogenous to shocks or changes met by the exogenous.

It is the VAR type autoregressive model here suggested since able to capture the connections between variables from at least two points of view : (i) the dynamic one, using several lags of each variable (e.g. past events influencing the present ones); (ii) the possibility of estimating an equation system in which each of variables becomes exogenous and endogenous in turn. The model will not reveal in this phase the specificities of counties, but restrict to drawing a general conclusion on the determinants of new companies at regional level in Romania through a number of observations used. Romania is divided into 41 counties, plus the municipality of Bucharest, distinctly managed as such (Bucharest is a municipality with similar county type rights, as by law, and the Ilfov county is just geographically surrounding it).

2. Literature review

As already mentioned above, this study bases on analyses of influences on the creation of new companies from factors like: unemployment rate, regional GDP, number of immigrants, size of entrepreneurship and population density. A series of studies on these determinative links had been conducted in Japan, Bulgaria, Czech Republic, Germany, Poland and USA before being in Romania, as well.

The endogenous will, of course, be the *newly established companies* at *regional level* in Romania. Two methods of measuring this variable are revealed in the literature. The ecological one approaches the new companies as a ratio to the whole mass of existing entrepreneurship. The other is the labour market method: the total of existing entrepreneurship relates to the number of people employed in the region. A study conducted in Bulgaria, on its 28 territorial districts, mentions these two approaches, then preferring the use of the ecological one (Alexandrova, 2015, mentioning also other authors). Another study conducted in the Czech Republic (Hajek and al., 2015), mentions this variable as the number of new companies to 1000 active individuals and this represents a measure for the entrepreneurial climate in the Czech micro-regions. A quality entrepreneurial climate can positively influence the individual's decision to become an entrepreneur, and other previous studies

came to support such an idea (Armington & Acs, 2002; Delfmann, Koster, McCann and Van Dijk 2014). At the same, according to Fotopoulos (2014), new business formation would be influenced by entrepreneurial climate that is supposed to have been already settled in the past.

As for here, we preferred the approach through the labour market - the number of new companies, relative to the active population , resulting in 420 observations (42 counties * 10 years*) for each variable, after which the data will be transformed in logarithms.

3. The exogenous

Existent entrepreneurship is the number of existent entrepreneurs and it is taken as favourable for the new entrepreneurs /new entrepreneurship in the literature. It is the appropriate design of a stable business environment in a(n entire) country. Akihiro Otsuka (2008) here similarly sees the Japan's 43 districts through an ,economic crowding' that defines a true entrepreneurship social mentality, partly inspired by Henderson at all (1995). Here the existing entrepreneurship is seen through the number of establishments related to the one of population in the same region. Basically, the higher the number of companies with their offices, the more the available capital boosting the rest of resources and factors, here including intelligence, talent and opportunities (Ciccone and Hall, 1996).

Then, it is argued in this study, together with Alexandrova (2015), for the mass of entrepreneurship with delayed effect on the newly attached business. Plus, this effect will limit to past influencing present and does not go to any influence in the future. A presumably positive relation of the future to the existing environment equals the opportunities opened and business encouraged; the negative one equals the same business opportunities rather embarrassed be it in general or in some of details. Hájek, Nekolová, & Novosák (2015) see the high entrepreneurship ratio to population as a *proxy* for the business climate.

GDP per capita at regional level

Most empirical studies in this field prefer rather the converse relation, i.e. focusing on new business formation effect on regional development. The empirical results of these studies (Fritsch, 2008) show that the effects of new business formation on economic development are not clear enough. Only few of them could provide persuasive evidence of such a positive relationship -- many others fail on this (Fritsch, 2008). On the contrary, the per capita growth as a predictor of new firm formation is found to have a positive effect by Armington & Acs (2002), not too much this way by Lee et al. (2004) and even contrary such effect (i.e., of per capita income growth on new firm formation)

by Sutaria & Hicks (2004). Back here, in our study the per capita regional GDP is a measure of per capita growth.

Unemployment and unemployment rate

The literature finds unemployment as also influential for the new companies founded or business enlargement. It is here found as a natural labour resource on specific entrepreneurs' area – i.e., this part of labour is primarily searching for a profit specific to self employment, as primarily compared to unemployment benefits. But in other views the same unemployment rather is negative factor for new companies foundation and not only (Delfman, 2014; Sutaria and Hicks, 2004). Similarly, Fotopoulos (2014) and Bishop (2012) see unemployment as likely caused by deep structural economic and social causes, the ones equally affecting entrepreneurship and Otsuka (2008) and Hajeck (2015) find the business environment is with high unemployment.

The population density

The population density (i.e., inhabitants per square kilometer) adds to determinant factors for new companies born, in the literature's view. Alexandrova (2015) sees this through ‚savings crowding'. When and where labour and capital do concentrate, on the contrary, specific costs of resources' and consumers' distancing lower. Actually, high population in a region means more available labour skilled to which then young and educated from around will be also attracted. And there will be more potential entrepreneurs amongst.

4. Data methodology

So, this is once more about the same above variables in the working context. *New companies* made here account in the same ONRC's data along the 2010-2019 years interval and shared for those 42 territorial districts – there is just the number of new companies per year to talk about. Raw data as such will be related to the employed population for a better image of the new companies' territorial distribution – namely, this will be new companies to each thousand of employed people.

Existing *entrepreneurship* dimension will equally consist in a number of companies -- i.e. their total number in Romania and by counties each year of our study --, data collected from INSSE (National Institute of Statistics) - i.e., these might be all: legal entities, family business units and/or authorized persons.

*GDP on region'*s data will come from the INSSE as expressed in million of RoN at current prices of each year during the 2010-2019 interval,

then CPI will be applied as since 2010 and this will relate to district population – i.e., per capita GDP will be in RoN per inhabitant.

Unemployment will be taken as its rate noted in each of districts by INSSE statistics. Finally, *population density* always is the number of inhabitants per square kilometer and, of course, once more for each of territorial districts, for which surface is the same during the whole years' interval.

Just here adding that all our data will express in logarithms.

5. Panel data unit root tests for stationary

We organised the data by grouping individual time series to form a panel with a longitudinal structure for an N (42 counties), T (11 years) period and K (4 independent variable panel). The next step is to test the basic statistical assumptions for the panel model. The first condition is stationarity. According to Lukáčik and Pekár (2009), non-stationarity causes a false regression and misinterpretation of the results (Lukáčik & Pekár, 2009). We applied panel unit root test that uses c*ommon root*: Levin, Lin, and Chu (2002), Breitung and Candelon (2005), Im, Pesaran, and Shin (2003) and *individual root* tests Augmented Dickey and Fuller-Fisher (ADF-Fisher) and Phillips and Perron-Fisher (PP-Fisher) using automatic lag length selection *Schwartz Info criterion* where the null and alternative hypotheses are expected for unit root or stationarity. So:

(a) H0: the unit root of this panel data is for all: new companies, entrepreneurship, density of population, immigrants, per capita GDP, unemployment.

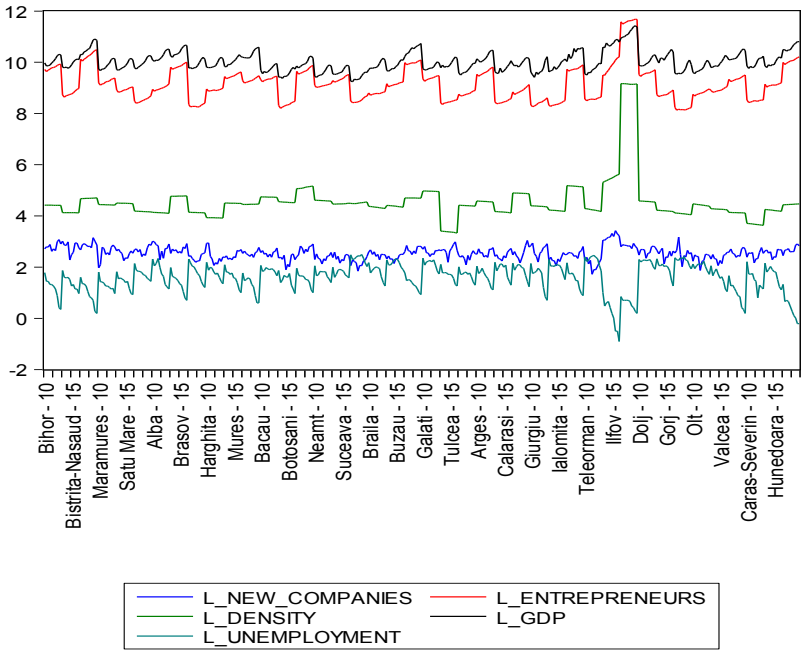
(b) H1: the panel data are stationary – see the admitted significance threshold of 0.05 or 5%. Data aren't stationary at level, but get *stationarity* with their first difference.

(c) All variables are found as integrated of order one I (1).

While Im, Pesaran, and Shin (IPS), Augmented Dickey and Fuller-Fisher (ADF-Fisher) and Phillips and Perron-Fisher (PP-Fisher) unit root tests assume single unit root and the autocorrelation coefficients change for cross sections but Levin-Lin-Chu (LLC) and Breitung unit root tests (Levin, Lin, and Chu, 2002; Breitung and Candelon, 2005) allow common unit root along cross sections.

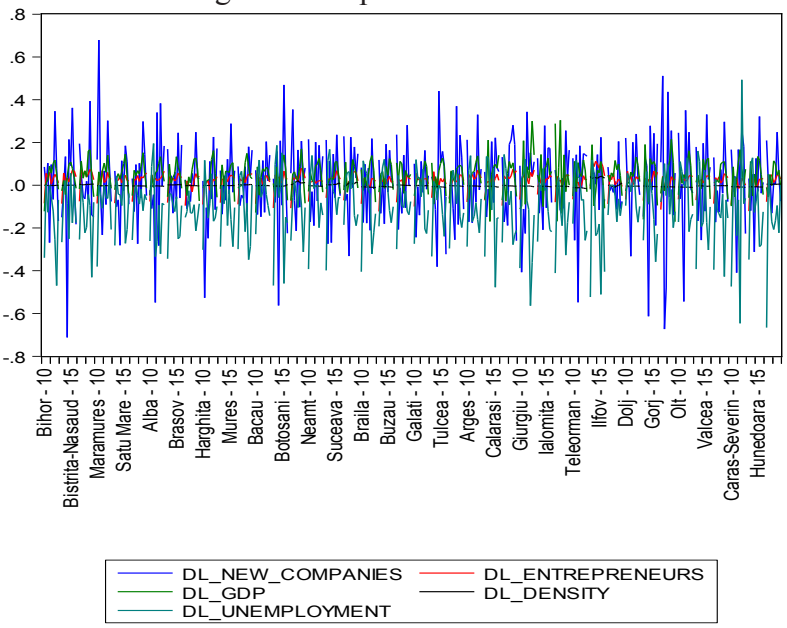
For each unit root test, the models are implemented with a deterministic trend and intercept (Kirikkaleli, et al., 2018).

Figure 1. Graph of level data



Source: Author calculation under Eviews technique

Figure 2. Graph of first difference



Source: Author calculation under Eviews technique

6. Co-integration; Pedroni Residual Co-integration Test

According to Granger and Newbold (1974), to have an order of integration of one, I (1), variables are pre-conditioned before performing the panel cointegration tests. Then, *Pedroni (Engel-Granger based) Residual Co-integration Test* and *Kao Cointegration test* using automatic lag as length selection the S*chwartz Info criterion w*as applied under the null hypothesis Ho:no cointegration versus alternative hypothesis of common AR coefficients. The purpose of Pedroni and Kao panel cointegration tests is to investigate the long-run relationships between the variables. Cointegration tests applied on level data is summarized below:

Table 1. (a) Pedroni Residual test for co-integration - Null Hypothesis: No co-integration versus alternative hypothesis: common AR coefficients. within-dimension)

	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	-3.377473	0.99960	-4.64957	1.0000
Panel rho-Statistic	4.809048	1.00000	4.718942	1.0000
Panel PP-Statistic	-10.57421	0.00000	-14.22772	0.0000
Panel ADF-Statistic	-1.293413	0.09790	-2.643786	0.0041

Source: Author calculation under Eviews technique

Table 1. (b) Pedroni Residual Co-integration test for co-integration - Null Hypothesis: No co-integration versus alternative hypothesis: individual AR coefficients. (between-dimension)

	Statistic	**Prob.**
Group rho-Statistic	7.021131	1.0000
Group PP-Statistic	-25.34726	0.0000
Group ADF-Statistic	0.159492	

Source: Author calculation under Eviews technique

As stated by Pedroni (1999), the Pedroni cointegration test is "based on pooling among both within dimensions and between dimensions. Pedroni (2001) has developed statistics that are based on pooling among dimensions, which will allow for heterogeneity in the autoregressive term" (Kirikkaleli, 2016, p. 213). Most of p-values to all statistics are higher than 0.05 as

significance level our variables appear as no co-integrated, or test could be considered inconclusive. The null hypothesis is so accepted for which VAR, (unrestricted) model will be appropriate – i.e., the opposite co-integrated variables hypothesis would be the one of restricted autoregressive vector (VECM) alternative model.

7. Model specification – PVAR (3) model; Lag length criteria

We chose the optimal number of lags to estimate the model. Most of the lag selection criteria for estimating PVAR suggested choosing lag 3: LR-sequential modified LR statistical test (each test at 5% level), FPE- Final prediction error and AIC- Akaike information criterion

Table 2. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-149.0537	NA	2.70E-05	3.667944	3.812636	3.726109
1	818.7822	1797.409	4.81E-15	-18.78053	-17.91238	-18.43154
2	977.975	276.6921	1.98E-16	-21.97559	**-20.38399***	**-21.33578***
3	1014.261	**58.74836***	**1.54e-16***	**-22.24430***	-19.92924	-21.31367
4	1034.96	31.04831	1.76E-16	-22.14189	-19.10337	-20.92043
5	1058.94	33.11587	1.90E-16	-22.11762	-18.35564	-20.60534
6	1088.472	37.26604	1.84E-16	-22.22551	-17.74008	-20.42241
7	1107.664	21.93463	2.36E-16	-22.08725	-16.87836	-19.99332
8	1133.954	26.91553	2.69E-16	-22.11795	-16.1856	-19.7332

Source: Author calculation under Eviews technique

According to definition, a VAR model (Geamănu M., 2014) represents a linear system of regressions in which a set of variables are estimated on the basis of past values of each variable, together with the other variables in the set. Model is used for its power to foresee joint dynamics of multiple time series based on linear functions of past observations. Under VAR model analyses can be made on impulse-response function (IRF) and error variance decomposition (FEVD) can be forecast for assessing the impact of shocks from one variable on the others. VAR model will develop with data arranged in panel and this will be called a PVAR - balanced panel (number of time observations is the same for each variable in ten years, 2010-2019). The same will be for a short panel since the number of cross-sectionals (see, the 42 counties in Romania) is higher than the number of time periods (for the same ten years).

In its basic form, a VAR consists of a set of K variables

$$Y_t = Y_{1t},\ldots,Y_{kt},\ldots,Y_{Kt}, \quad \text{for } k = 1,\ldots, K \tag{1}$$

After including 'p' lags of the endogenous, the $VAR_{(p)}$ model may be defined as:

$$Y_t = A_1 Y_{t-1} + \ldots + A_p Y_{t-p} + \varepsilon_t \tag{2}$$

in which A_i are (K×K) coefficient matrices for i=1,…,p and ε is a K-dimensional *white noise process*.

8. Results and interpretation

New companies' formation appears to be influenced by its values corresponding to the previous years. An increase of 1% of new companies' formation in the previous three years could lead, on the contrary, to a decrease in formation of new companies in the current year with 0,27%.

Then, there is direct-positive relationship between entrepreneurial population and new companies' formation, as proved by the same results with a p-value lower than 0,05 significance level. An increase of 1% in number of entrepreneurial activity in last three years leads to an increase of about 2.0% per year in the number of new companies' formation. This means that an already done and stable business environment clears the way for new entrepreneurs.

Another positive and direct influence on new companies – i.e. as current new business – comes from the previous year GDP of the region. A 1% increase of previous GDP makes a plus of 0.36% in the business formation.

But really the most influential and positive factor on new companies' formation seems to be the density of population. An 1% increase of population density in the past three years leads to an increase as high as 11% for the new companies in current year, in given areas.

Instead, unemployment is found as insignificant exogenous in given context, due to p-value for all lagged variables found as higher than the significance level of 0.05. Increase or decrease in unemployment actually misses all direct influences on new companies' formation. It might be not quite directly available the entrepreneurship option for unemployed people, as usually.

The R^2 determination coefficient is 0.65 and so expresses that 65% of the evolution of new companies' formation could be explained by here above considered exogenous: entrepreneurship, GDP, unemployment and population density. The remaining 35% is the percentage of total variation of endogenous being explained by factors other than those above considered. The intercept value of 0.02 represents the intersection between the OY axis and the regression line or the average value of variable Y (new companies) when the other factors are zero.

Granger Causality/Block Exogeneity Wald Tests

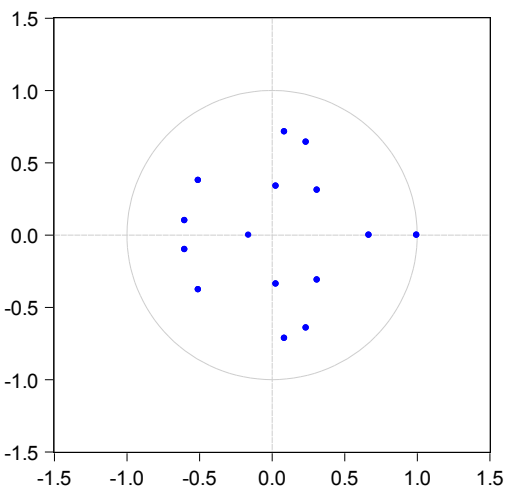
Once the VAR system estimation is done, then VAR Granger Causality test – i.e. Block Exogeneity Wald Tests -- is applied to find whether and/or how much all exogenous in turn might claim some cumulative causality influence upon the endogenous. This test's H0 null hypothesis means there is no Granger causality from all variables (jointly) to each of them. The H1 alternative hypothesis is, of course, that there is such Granger causality between all variables and each of them.

Our results show that new companies' formation in Romania is significantly influenced by all mentioned variables since jointly p-value for Granger causality block test is lower than 0.05 level of significance. It is an opposite result for density of population as endogenous – i.e., no any block impact of variables on density of population, the same as joint p-value of Granger causality block test is higher than 0.05 level of significance.

Testing the VAR stability

According to Lutkepohl (2005) and Hamilton (1994), the VAR model is stable if *all moduli of the companion matrix are strictly less than the unit.* The stability of a system assumes that the shocks are transient and then disappear after a certain period of time. In our case, the estimated PVAR model satisfies the stability condition. (Figure 3).

Figure 3. Inverse Roots of AR Characteristic Polynomial



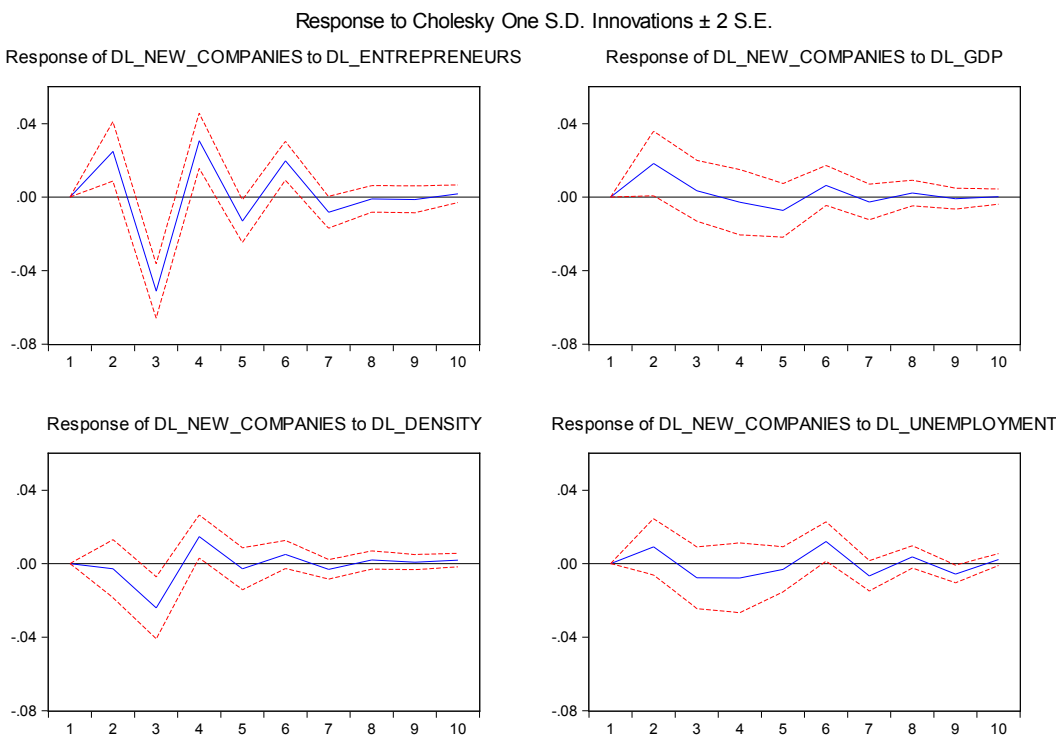
Source: Author calculation under Eviews technique

The impulse-response function

This function can be performed only for/when a stable PVAR and it captures the time profile of the effect of shocks at a given point in time on the expected future values of variables in a dynamic system (Simo-Kengne, 2012). *An impulse-response is the reaction of any dynamic system in response to some external change.* In economics, and especially in contemporary macroeconomic modeling, impulse-response functions are used to describe how the economy reacts over time to exogenous impulses usually called ‚shocks' and often modelled in contexts of vector auto-regression.

A shock to one variable not only directly affects this variable, but is also transmitted to all of the other endogenous through the dynamic (lag) structure of the VAR. An impulse-response function reveals the effect of a one-time shock to one of the innovations on current and future values of the endogenous. More generally, an impulse response refers to the reaction of any dynamic system in response to some external change (Cao Lu & Zhou Xin, 2010). The method used was: *Analytic (asymptotic) - SEs based on the response asymptotic distribution (Lütkepohl, 1990); SEs condence bands; confidence interval computed as +/– 2 SE confidence bands.*

Figure 4. Impulse Responses function of PVAR



Author calculation under Eviews10 technique

The blue line represents the impulse response function and the red lines represent 95 percent confidence interval. The impulse response function must lie within 95 percent confidence interval. Now, just keeping interested in the presumptive effect of these five variables' system on the companies' formation, as endogenous. The impulse-response function among the rest of variables will extend its report from the above graphs to the multiple graphs.

When the impulse is one standard deviation of existing entrepreneurship, new companies' formation responds with an obvious fluctuation that is the highest positive in the first two years, then decreases in the next two years and finally the impulse-response function gets smooth and positive till the end of 10-year considered interval. When the impulse is one standard deviation of GDP per capita, all response of new companies' formation is positive at most time responsive period and the fluctuation is very smooth. A smooth fluctuation is also found in new companies' formation as a result of one standard deviation shock on unemployment rate. A negative impact on new companies' formation could have one standard deviation in density of population, as starting in the second year, after first year with no fluctuation; starting with 6th year, fluctuation of new companies' formation as a response of a shock in population density, become smooth.

Variance decomposition of the new companies' variable (Lütkepohl, 2007)

Variance decomposition, also called forecast error variance decomposition (FEVD), is used to help the interpretation of a vector auto-regression (VAR) model once done.

Table 3. Variance decomposition of new companies, as a variable

Period	S.E.	DL_NEW_ COMPANIES	DL_ ENTREPRENEURS	DL_GDP	DL_ DENSITY	DL_ UNEMPLOYMENT
1	0.121105	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.127288	93.53471	3.829245	2.073944	0.046390	0.515715
3	0.139851	77.94972	16.52939	1.779524	3.010228	0.731137
4	0.145536	73.83930	19.71631	1.679935	3.807675	0.956786
5	0.146413	73.04103	20.26650	1.904833	3.797959	0.989676
6	0.149020	71.25313	21.32892	2.020028	3.779888	1.618031
7	0.149474	70.84829	21.50457	2.039384	3.799860	1.807898
8	0.149601	70.79316	21.47210	2.058164	3.811239	1.865332
9	0.149752	70.69545	21.43572	2.057234	3.806659	2.004940
10	0.149794	70.65677	21.43885	2.056348	3.821341	2.026694

Cholesky Ordering: DL_NEW_COMPANIES DL_ENTREPRENEURS DL_GDP DL_ DENSITY DL_UNEMPLOYMENT

Author calculation under Eviews10 technique

Variance decomposition function is here employed in 'Ewiews10' program to forecast on 10 years ahead and to understand shorter and longer run associations between variables. The variance decomposition indicates the amount of information through which each variable contributes to the other variables. It finds how much of the forecasting error variance of each of the variables can be explained by exogenous shocks to the other variables. For the first year forecast, 100 % of forecasting error variance of new companies' formation is explained by the variable itself; all the other variables in the model miss all influence on new companies' formation in first year -- i.e. new companies' formation variable is as *strongly endogenous* as implying strong influence from its own, as a variable.

Let us have an example of the 3rd year forecast. 77.9% of forecasting error variance of new companies' formation explains by the variable itself. Then, a shock to entrepreneurial activity can cause 16.5 % fluctuation in new companies' formation; a shock to GDP can cause 1.77% fluctuation of new companies' formation; a shock to density of population can cause 3.01% fluctuation of new companies' formation and finally, a shock to unemployment rate can cause 0.73% of new companies' formation – i.e., sum of all these percentages makes 100%. For a *longer term*, let us have another example of 10th year ahead, 70.65% of forecasting error variance of new companies explain by variable itself. Shock to entrepreneurial activity can cause 21.43 % fluctuation in the variance of new companies' formation; a shock to GDP can cause 2.05% fluctuation of new companies' formation; a shock to density of population can cause 3.82 % fluctuation of new companies' formation; finally, a shock to unemployment rate can cause 2.02 % fluctuation on new companies' formation.

These are to conclude that even own shock contribution is supposed to go down in the long run. New companies' formation shows a strong influence since the first period towards the future. The influence of entrepreneurial climate increases in the long run, but remains stable at around 21% (*least exogenous variable*). The influence of GDP, density and unemployment rate remain all week in longer run, at 2%-3% in explaining forecasts of variance in number of new companies. Variables are *strongly exogenous* since implying a weak influence on the dependent variable. After estimation of the panel P-VAR model, it becomes equally important performing panel data series correlation tests to confirm the validity of this panel – i.e., together with the above-mentioned model stability.

Then, *VAR Residual Portmanteau Tests for Autocorrelations* was performed with its Null Hypothesis H0: of no residual autocorrelations up to lag h, and alternative hypothesis H1: residuals are correlated. The probability

of p-values for all lags are more than 0.05 significance level, therefore the null hypothesis (we accepted the null hypothesis) cannot be rejected and this means that all the equations are free from serial correlation.

9. Summary and conclusions

Let us first reiterate that the above study was for newly created business and presumable determinants like: business environment in place, unemployment rate, GDP of the region and density of population in the same region during the analysed period. Data of Romania's 42 counties – i.e. as territorial districts – have been used and the reference period was the 2010-2019 years interval. These data came from Romania's National Institute of Statistics (INSEE) and National Registering Office for companies (ONRC). All data series were found as non stationary at level, then *stationary* was obtained at first difference – i.e. Schwartz Info criterion and Test for *stationary*. *Pedroni Residual Co-integration* test for co-integration between variables was then employed in order to search for presumable long run association of the same variables. Results looked inconclusive. Next step consisted in an autoregressive VAR model applied – i.e. an equation system for these variables. This system was going to be one of three lags according to tests already mentioned as applied – i.e. *sequential modified LR statistic test,* with each test at 5% level, *Final Prediction Error (FPE)* and *Akaike Information criterion (AIC).* Then, *stacked Pair-wise Granger causality test* came to establish bi-, versus uni-directional causality between variables.

Results of the VAR estimation model revealed significant effects on new companies' formation from: already existent business environment, regional GDP – e.g. estimating income per inhabitant in that region – and population density. These variables' influences proven significant – i.e. lower than 0.5 significance p-value.

Then, the unemployment rate was found to be *insignificant* for a p value higher than 0.05 significance level – i.e., there is rather no direct relation between unemployment and companies' formation.

The *determination coefficient* R^2 *squared* was found at 0.65, and says that 65% from the evolution of new companies' formation could be explained by the exogenous: entrepreneurship, GDP, unemployment and population density. The *"F statistic"* **used in combination with the p-value** proves that overall results are significant since comparing the joint effect of all the variables together – i.e. our model F statistics p-value is 0.0.

The *Durbin Watson (DW)* statistic test for residuals' auto-correlation always has a value between 0 and 4. A value of around 2.0 means that there is no auto-correlation detected in the sample -- i.e. our model show a *Durbin Warson statistic* value = 2.10. Also, our PVAR model with three lags was found stable according to *Roots of Characteristic Polynomial* graph and table, with no roots outside the unit circle.

Finally, we performed *VAR Residual Portmanteau Tests for Autocorrelation, impulse-response* function and forecast *variance decomposition* which determines the reaction of each endogenous variable to shocks or changes manifested by the rest of variables.

References

Abrigo, M.R.M. & Love I. (2016). Estimation of Panel Vector Autoregression in Stata. *The Stata Journal,* 16(3):778-804.

Acs, Z. J., Audretsch, D. B., Braunerhjelm, P., & Carlsson, B. (2005). *Growth and entrepreneurship: an empirical assessment*. CERP working paper no. 5409, London, UK.

Acs, J.Z, Audretsch D.B, Braunerhjelm P. and Carlsson B. (2012). Growth and entrepreneurship. *Small Business Economics,* Vol. 39, No. 2 (September 2012), pp. 289-300. Published by: Springer.

Alexandrova, M. (2015). Effects of Regional Determinants on New Businesses Formation: The Case of Bulgaria. *International Journal of Economic Theory and Application*, 2(4): 33-39

Aljandali, A, & Tatahi, M. (2018). *Economic and Financial Modelling with EViews, A Guide for Students and Professionals, Statistics and Econometrics for Finance*. Springer International Publishing AG.

Akihiro, O. (2008). Determinants of new firm formation in Japan: A comparison of the manufacturing and service sectors. *Economics Bulletin*, Vol. 18, No. 4. pp. 1-7.

Barbieri, L. (2006). *Panel Cointegration Tests: A Review*. Serie Rossa: Economia–Quaderno, N. 44.

Cao, Lu & Zhou, Xin. (2010). *Impulse-Response function Analysis: An application to macroeconomic data of China*, School of Economics and Social Sciences, Hoskolan Dalarna, D-Level Essay in Statistics for M.S. Degree, Supervisor: Changli He.

Časni, C., Dumičić, K., & Tica, J. (2016). The Panel VAR Approach to Modelling the Housing Wealth Effect: Evidence from selected European post-transition economies. *Naše gospodarstvo/Our Economy,* vol. 62(4): 23–32.

Delfmann, H., Koster, S. (2016). The effect of new business creation on employment growth in regions facing population decline. *Ann Reg Sci* 56:33–54.

Dutse, A.Y, Aliyu I. (2017). Macroeconomic Factors and Entrepreneurship in Nigeria. *International Journal of Business and Management Future*, Vol. 1, No. 1. Centre for Research on Islamic Banking & Finance and Business.

Fotopoulos, G. (2014). On the spatial stickiness of UK new firm formation rates. *Journal of Economic Geography*, 14(3): 651-679.

Fritsch, M. (2008). How does new business formation affect regional development? Introduction to the special issue. *Small Bus Econ* 0:1–14. Springer Science and Business Media B.V. DOI 10.1007/s11187-007-9057-y.

Geamănu, M. (2014). *VAR analysis on Foreign Direct Investment in Romania*, "Spiru Haret University" of Bucharest, Romania Theoretical and Applied Economics, Volume XXI (2014), No. 4(593), pp. 39-52.

Giannetti, M., & Simonov A. (2004). On the determinants of entrepreneurial activity: Social norms, economic environment and individual characteristics. *Swedish Economic Policy Review* 11 (2004): 269-313.

Granger, C.W., and Newbold, P. (1974). Spurious regressions in econometrics. *Journal of econometrics*, 2(2): 111-120.

Hájek, O., Nekolová, J., Novosák, J. (2015). Determinants of new business formation – some lessons from the Czech Republic. *Economics and Sociology*, 8(1): 147-156.

Kane, T. (2010). Firm Formation and Economic Growth The Importance of Startups in Job Creation and Job Destruction. *Kauffman Foundation Research Series.*

Kao, C. (1999). Spurious regression and residual-based tests for cointegration in panel data. *Journal of Econometrics*, 90(1): 1-44.

Kirikkaleli, D. (2016). Interlinkage between economic, financial, and political risks in the Balkan countries: Evidence from a panel cointegration. *Eastern European Economics*, 54(3): 208-227.

L¨utkepohl, H. (2005). *New Introduction to Multiple Time Series Analysis*. Heidelberg: Springer.

Nekolova, J., Jiri Novosak, J., Hajek, O. (2016). The Changing Determinants of New Business Formation in the Czech Republic. *Montenegrin Journal of Economics*, 12(1):7-20.

Novosák, J., Ovosáková, J., Hájek O., Joanna Górska-Szymczak. (2017). The geography of new business formation in the Czech Republic: a cross-section analysis (2003-2014). *Human Geographies – Journal of Studies and Research in Human Geography* Vol. 11, No. 2.

Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and statistics*, 61(S1): 653-670.

Stoica, O, Roman, A., Rusu, D. (2020). The Nexus between Entrepreneurship and Economic Growth: A Comparative Analysis on Groups of Countries. *Sustainability* 12, 1186.

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ORGANIZATION OF FINANCIAL-ACCOUNTING ACTIVITY IN PUBLIC ENTITIES

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Abstract: *The financial-accounting activity represents the instrument within the public entity, with the help of which the patrimony of the public entity is managed economically, financially and. This activity records transactions and operations related to the establishment and use of public resources. The recording of operations in the entity's primary and accounting records complies with certain principles, rules and regulations, both for the collection and processing of financial data and information, and for orderly, systematic and documented recording. The financial-accounting activity reflects in monetary terms the movable and immovable goods, the availabilities, the rights and obligations of the public entity, the entrances or exits in and from the patrimony, other movements or patrimonial changes determined by the economic and financial operations realized on the incomes, expenses and results obtained. With the help of the financial-accounting activity, the collection and payment operations of the public entity are highlighted. It provides information to the management of the public entity regarding the execution of the revenue and expenditure budgets, the result of the budget execution, the patrimony under administration, the patrimonial result, the cost of the programs approved by the budget.*

Keywords: *financial-accounting activity, financial accounting, management accounting, public entity, financial-accounting information, financial-accounting system*
Jel Classification: ***M00; M41; M42***

Characteristics of the financial-accounting activity

According to the opinion of the specialists in the field (Raude and Pagat, 1991), the accounting is viewed from three points of view:

- usual - represents „the set of rules applicable to the management of state revenues";
- technical - represents the „rules for presenting public accounts";
- administrative - implies that „the rules of public accounting are both rules of presentation of accounts and rules of organization of public accounting services".

According to these definitions, the organization and keeping of accounting is mandatory for all public entities.

The financial-accounting activity, through the actions carried out, provides the necessary resources in order to finance the programs, projects and activities carried out to achieve the organizational objectives.

The objective of the financial-accounting activity is the realization of revenues and the use of funds, the management of public and private patrimony of the state and administrative-territorial units, with the rights and obligations resulting from it, highlighting the results of the activity and elaboration of financial statements and financial reports.

Currently, the financial-accounting activity responds to the need to satisfy the management needs of the public entity, taking into account the legal, fiscal, social and economic imperatives. It is a complex system of collection, grouping, processing, recording, generalization of accounting and financial reporting elements and ensures the connection with decision makers or various users.

Organization of financial-accounting activity

The organization of the financial-accounting activity implies a set of processes that specify the attributions, tasks, competencies and responsibilities of the personnel working in the field. Within the organizational structure, the functional relations of the department with the other functional structures within the entity are established, as well as the representation relations with third parties.

According to the opinion of specialists in the field, the area of financial-accounting activity includes:

- the accounting of budgetary revenue and expenditure which must reflect the collection of revenue and the payment of expenditure incurred during a financial year;
- the accounting of the state treasury, which ensures the collection and payment operations regarding public funds and other state operations, in accordance with the legal provisions in force;

- the general accounts reflecting the evolution of the financial and patrimonial statements, as well as of the surplus or deficit of the patrimony;
- accounting for analyzing the costs of approved programs.

The financial-accounting activity ensures the systematic and chronological registration of all economic and financial operations performed by the public entity, the processing and storage of information on the financial situation, financial performance and cash flows.

The responsibility for the organization and functioning of the financial-accounting activity rests with the head of the entity, who also fulfills the function of authorizing officer, and the financial-accounting activity is organized and carried out within a specialized department established separately within the entity. The financial-accounting activity is grouped within the financial-accounting function and represents an "interface" between: (1) the public entity, within which the activities and processes specific to the object of activity are exercised; (2) state, being the one that decided the establishment of the public entity and granted certain competencies to exercise in its name and (3) citizens, as payers of taxes and fees and applicants and beneficiaries of public services provided by the entity publish.

The organization of public accounting implies the observance of rules and norms common to those of general accounting, respectively:

- the use of common accounting records and forms;
- use of the balance sheet methods and the general chart of accounts;
- compliance with pre-established accounting rules and methods;
- recording economic operations chronologically and systematically, simultaneously in the debit of some accounts and the credit of others;
- determining the total amounts owed and the amounts credited, as well as the final balance of each account;
- presentation of the execution regarding the revenues collected and the payments made, as well as the surplus / deficit.

The financial-accounting activity is divided into two components: financial accounting, which provides information externally and management accounting, which provides information internally.

Financial accounting provides information about the entity's past activity, „management accounting is a system that calculates and analyzes the value of internal flows in the organization. It must be adapted to the activity, functional structure and requirements of decision makers to the evolution of the economic environment and technological (Iacob, Ionescu, and Goagără, 2007)". In these conditions we can appreciate that, through the tools used,

the management accounting provides information on the basis of which the decisions to be taken in the future can be based.

The financial-accounting activity contributes to the realization of the activities and programs of the entity through the balanced distribution of financial resources, and through the operations it performs, it provides information on the "economic and financial condition of the entity". The information provided by the financial-accounting activity is used by the management in the decision-making process, and by the external users in the decision-making.

The importance of financial-accounting activity as a source of information

Those responsible for the financial-accounting activity ensure, together with the subordinate staff, the systematic and chronological organization and management of the accounting, in accordance with the law, and carry out the annual inventory of the assets and liabilities elements.

The purpose of the financial-accounting activity is to prepare the periodic and annual financial statements, in compliance with the rules and procedures of preparation, to keep the supporting documents that formed the basis of the records made in the registers and financial statements, as well as to adapt management accounting to the specifics of the public entity.

The practice in public entities is represented by the fact that the accounting of financial-accounting activities is organized in a double entry and ensures the evidence of movements and transformations in the structure of assets, equity and financial results, at certain times.

Taking into account the internal environment of the entity, the financial-accounting activity is influenced by:

- the strategic objectives and the way in which the public entity has identified and ensured the necessary resources to achieve them;
- the organizational structure, respectively the way of structuring and dimensioning the financial-accounting department and the procedures and tools used in order to ensure the accomplishment of the financial-accounting activity;
- management style, which must ensure good representation in relations with the functional structures within the entity or with third parties;
- the quality of the staff working in the financial-accounting department, respectively the level of knowledge, skills and values that it holds, so that, through the analyzes, records and documents developed to ensure the provision of real financial information.

The financial-accounting activity is also influenced by the external environment of the public entity, respectively by the stability of the applicable legislative and methodological framework, the existing culture and mentality within the community where it operates and whose needs and necessities must ensure them, as well as the economic situation. of that community.

Public entities shall record in supporting documents, manually or using computer systems, the economic and financial operations at the time of their performance, on the basis of which they make entries in journals, files or checks, according to the established rules.

The checking balance is the accounting document used to verify the accuracy of the accounting records and to check the concordance between the synthetic and the analytical accounts. It is drawn up on a monthly basis, based on data taken from the general ledger and is the basis for the preparation of financial statements.

The instrument available to the public entity for the fulfillment of its functions and attributions, regarding the allocation of resources, redistribution of revenues and ensuring economic and social stability, is the budget of revenues and expenditures. With its help, the public entity provides annually the size and structure of revenues to be collected and expenses to be realized, the financial flows that form the financial resources and the financial flows that are generated from the management of these resources.

The document presenting the balance sheet is the financial statements, which include: the balance sheet, the income statement, the statement of cash flows, the statement of changes in the structure of assets / capital, the annexes to the financial statements, which include: accounting policies, explanatory notes and budget execution.

The financial statements provide a clear picture of assets, liabilities, financial position, as well as financial performance and equity result.

An important feature of the financial-accounting activity is the fact that any economic or financial operation, before being performed in accounting, must be recorded in supporting documents, prepared and approved under the law.

The financial-accounting activity is important within the public entity, due to the information it provides and the contribution it has regarding the improvement of programs and services provided by the public entity.

In order to ensure a qualitative level corresponding to the financial-accounting activity, the management of the public entity has the responsibility to develop accounting policies for the operations performed, in accordance with the regulations in force "it is important for each entity to establish accounting policies for accounting recognition of transactions. strict compliance with

accounting regulations" and "the management of each entity must establish accounting policies for the operations carried out. These policies must be developed taking into account the specifics of the entity by specialists in the economic and technical field, knowledgeable of the activity carried out and of the strategy adopted by the entity".

The role and place of the financial-accounting activity within the public entity

The financial-accounting activity is responsible for the presentation of the patrimony situation and of the operations regarding the patrimony, respectively the evidence, calculation, analysis and control of the movable and immovable goods expressed in monetary standard; ensuring the control of the patrimonial operations and of the processing procedures used, as well as of the accuracy of the accounting data provided.

The role of the financial-accounting activity - the financial-accounting activity represents at the level of the entity a subsystem, which includes inputs, processes, outputs and results, with the help of which the manager performs his attributions regarding the economic function of the public entity.

Regarding this assessment, we consider that the financial-accounting system represents at the level of the public entity a subsystem which in turn breaks down into the financial subsystem and the accounting subsystem. The financial subsystem aims at ensuring the financial stability of the entity, monitoring the efficiency of the use of resources and adjusting the „critical points", which generate losses, as well as optimizing costs. The accounting subsystem provides the information necessary for an adequate control over the financial elements and the operations carried out and ensures the obtaining of managerial information from different levels of the organization for the purpose of planning, decision making, monitoring and performance control.

The financial-accounting activity ensures a faithful and clear image, regarding the situation of the execution of the revenue and expenditure budget of the entity and of the information it provides, respecting the specific accounting principles. In view of the above, we consider that the role of the financial-accounting activity is to correctly reflect the process of execution of the revenue and expenditure budget, to provide operative and real information on the economic condition of the entity, to help the execution correct and complete budget and prevent error and fraud. Seen as an integral part of management, the financial-accounting activity interferes with the management functions, but the difference is given by the intensity with which these functions are manifested.

Place of financial-accounting activity - the decision-makers within the entity are concerned with finding solutions to ensure the availability of financial resources necessary to carry out activities in order to ensure the achievement of objectives.

Analyzed from an economic point of view, the financial-accounting activity reflects, following the use of specific procedures and instruments, the existence, status and transformation of capital. It is reflected in the form of procurement, acquisition, allocation, use, consumption or replacement of goods.

Analyzed from a financial point of view, the financial-accounting activity reflects the existence, state, movement and transformation of economic resources. They are individualized at the time of entry, in the process of use, as well as at the exit and are treated at the same time as assets and liabilities.

In these conditions, the financial-accounting activity is important, because it reflects the patrimonial operations and provides information regarding the economic state of the entity, information that is used by a series of users, depending on their interests.

Particularities of the financial-accounting activity in the public entities

The financial-accounting activity, as part of the general accounting, is mandatory to be organized by all public entities and must ensure the registration of all operations related to financial resources, patrimonial inflows and outflows, as well as other operations related to the activity carried out.

Public entities have the obligation to process and maintain information on the balance sheet and the results obtained, to control the patrimonial operations and processing processes used, as well as to be responsible for the accuracy of the financial data and information.

From the research of the specialized literature we deduced the idea that the rules and methods of organization and functioning of the accounting of public entities are common with those of general accounting, as follows:

- the accounting is organized and conducted in the double entry;
- the recording of operations and transactions is done chronologically and systematically in accounting;
- the amounts resulting from the economic operations carried out are totaled and recorded in the debit and credit of some accounts, according to certain pre-established rules and procedures;
- drawing up, on a monthly basis, the checking balance, which reflects the equality between the total debit and credit amounts or the total debit and credit balances of the accounts;

- the presentation of the budget implementation, at least annually, of the revenue received and expenditure incurred, as well as of the surplus or deficit;
- the use of models of accounting records and common forms on financial and accounting activity.

In our opinion, the financial-accounting activity carried out by public entities has certain characteristic features, as follows:

- public entities are non-profit and do not carry out productive activities, they are bodies through which the state exercises its role, attributions and functions in various fields (administrative, socio-cultural, public order, social assistance, economic);
- public entities are not profit-making, they are organizations that generally carry out and produce public services, depending on the needs and requirements of citizens;
- revenues generally consist of taxes and duties, allocations from the state budget, own revenues, other revenues established by law;
- the financing of current and capital expenditures is ensured from revenues established or received, from extra-budgetary revenues or from special purpose sources;
- the amounts resulting from the sale or capitalization of the owned goods constitute revenues to the local budget;
- fixed assets resulting from investment expenses or received by transfer increase the public or private patrimony of the entity;
- generally, do not set indicators of profitability and economic efficiency, but set indicators for measuring the degree of achievement of objectives;
- does not calculate and record the wear and tear of inventory items or the depreciation of fixed assets gradually, but only once, when purchasing them;
- for the activity carried out, they draw up Income and Expenditure Budgets, and the results obtained are reflected through the Financial Statements;
- the financing of the activity is made on the basis and within the limits of the approved revenue and expenditure budgets;

The quality of the information produced by the financial-accounting activity

Financial-accounting information is useful if managers use it to understand economic and quality reality when making appropriate decisions.

The current practice in public entities is to provide external financial-accounting information only if it is a legal obligation (Malciu, 1998).

Financial-accounting information is a basic component of the information process and the main source through which the economic situation of the entity is known. In this sense, the specialists in the field (Feleagă and Ionescu, 1998) consider that the financial-accounting information „proves indisputable qualities that increase the efficiency of modern management".

Opinions on the efficiency or quality of financial-accounting information must be common and lead to „the objective and complex need to assess the efficiency of each category of information circulating in the system and their contribution to maximizing management and global economic efficiency (Paraschivescu, and Păvăloaia, 1999)".

Financial-accounting information is the basis for current or operational decisions, as well as strategic decisions, taken in all areas of the entity's activity, including investment development. They fall into two categories: financial accounting information and management accounting information.

Financial accounting information is intended for external users, such as investors, employees, creditors, the government or the general public, and is provided through summary financial statements.

The management accounting information is intended for internal users, respectively for the management of the company. This information is non-standard and includes data on the costs incurred for the provision of public services. The development of the activities of the public entity determined, both the diversification of the financial-accounting activity, as well as the increase of information needs and "the development of the economic information system and its component elements (Danescu, 2000)".

In our opinion, the information system of the public entity "incorporates the methods, techniques and tools used to collect, record, transmit, process and capitalize on information in a system (Oprean, Racoviţan, and Oprean V., 1994)" so as to meet the needs of management or users. Also, the financial-accounting information represents data collected and processed, according to certain rules in order to provide a true picture of the economic situation of the public entity. They reflect „the form of interconnection between two material processes so that the properties of one (the issuing process) are reproduced in the second (the receiving process) (Căinap, and Bătrâncea, 1993)".

A financial-accounting information system is an organized set of economic information, obtained by processing primary data on economic and financial activities carried out by the public entity and which are necessary for the organization and management of its accounting.

The information contained in the financial-accounting information system meets the following requirements: it provides the necessary elements to substantiate the decisions; correctly presents the patrimonial situation of the public entity and faithfully presents the results of economic and financial activities carried out by the public entity. In general, „financial analysis uses all sources of information that can clarify certain issues in order to establish a financial diagnosis (Cohen, 1997)."

In the process of providing financial-accounting information there are also some limitations, generally determined by the following: the data provided by the financial-accounting activity are expressed in historical figures, not being adjusted to ensure their comparability; equity valuation methods differ from one entity to another, which creates difficulties in making comparisons between various results obtained and reluctance to present information on the quality of programs and applications, staff qualification, management team capacity, adequacy of the system. management and established labor relations.

In substantiating managerial decisions, financial-accounting information has, in relation to other types of information, some advantages, as follows (Vasile, and Croitoru, 2012): most of the information circulated within an entity is of an accounting nature; offers the possibility of accurate representations of economic phenomena and processes; have a high degree of certainty; characterizes the size and value of economic flows that arise within the entity.

In our opinion, the existence of relevant financial-accounting information constitutes for the management of the public entity the support of the substantiation and decision-making of the managerial, and for the external users the support to act and operate in safe conditions.

Conclusions

Improving the performance of a public entity involves the possibility to substantiate and adopt decisions based on information that meets certain quality criteria. In this sense, the financial-accounting system proves its usefulness only in the conditions in which it helps to prepare the managerial decision and allows its taking in conditions of efficiency and effectiveness.

In this context, the economic and social environment in which the public entity operates is constantly changing and evolving, following the opportunities and constraints, internal and external, to which the entity is subject.

The importance of the financial-accounting activity carried out by the public entity is characterized by the functions that this field of activity fulfills, respectively:

- the function of reflecting and centralizing the financial-accounting information. The financial-accounting activity constitutes the sector of activity of the public entity where information regarding the collection and allocation of the resources at its disposal is centralized and consolidated.
- financial communication function. The place that financial-accounting information occupies in the entire information system of the entity, gives this function a special importance, given that most users rely on these reports when assessing the position and financial performance for decision making.
- analysis function. This function is manifested in the process of assessing the degree of achievement of the entity's objectives regarding the commitment and use of resources and aims to identify deviations from the results obtained compared to those planned, following the performance measurement using established indicators and to establish corrective measures. in order to improve the activity carried out.
- the forecast function. The accomplishment of this function supposes the determination, based on the information provided by the financial-accounting activity, of some pertinent forecasts regarding the way in which the entity will carry out its activity in the next period.

In the broadest sense, the accounting of public entities is an activity specialized in measuring, valuing, knowing, managing and controlling assets, liabilities and equity, as well as the results obtained from the activity carried out within the entity.

The measures taken ensure that corporate governance officers ensure that the activities are under control, that the entity's assets have not been damaged, and that operations, transactions and results are properly reflected in the primary, accounting and financial reporting documents.

The optimization of the financial-accounting activity must be regarding the evaluation of the use of public resources, the appreciation of the obtained performance, the analysis of the measures taken regarding the use of resources and the degree of fulfillment of the established objectives.

In order to obtain quality financial-accounting information, which would help to substantiate the managerial decisions, it is considered that "the financial-accounting activity carried out at the level of public entities to perform the measurement, evaluation, knowledge, management and control of assets, liabilities and equity , as well as the results obtained from economic activity (Vasile, Croitoru, and Mitran, 2012)".

In our opinion, the financial-accounting system should not be considered as consisting only of the activities carried out within the financial-accounting department, but, appreciated, in terms of all activities carried out within the entity that have financial implications.

References

Căinap, I., and Bătrâncea, I. (1993). *Economic and financial analysis of industrial companies*. Cluj-Napoca: Babeş-Bolyai University.

Cohen, E. (1997). *Analyze financiers,* 4e edition, Paris: Economical.

Dănescu, T. (2000). *Annual accounts.* Cluj-Napoca: Dacia Publishing House.

Feleagă, N., and Ionescu, I. (1998). *Accounting Treaty*. Bucharest: Economica Publishing House.

Iacob, D., Ionescu I., and Goagără D. (2007). *Management accounting in accordance with international practice*. Craiova: Universitaria Publishing House,

Malciu, L. (1998). *Cererea şi oferta de informaţii contabile,* p. 123. Bucharest: Economica Publishing House.

Oprean, D., Racoviţan, D.M., and Oprean, V. (1994). *Management and managerial informatics*. Oradea: Eurounion Publishing House.

Paraschivescu, M. D., and Păvăloaia, W. (1999). *Economic and social accounting.* Iasi: Tehnopress Publishing House.

Raude, V. and Pagat, J.C. (1991). *Cours sur les règles de la comptabilitè publique.* Ecole naţionale desservices du Tresor, Paris.

Vasile, E., and Croitoru, I. (2012). *The importance of accounting as a source of information*, Chisinau International Conference, April 2012.

Vasile, E., Croitoru, I., and Mitran, D. (2012). Risk management in financial-accounting activity. *Internal Auditing & Risk Management* 7(1): 13-24.

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