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This new journal series is the new face of two former journals:

- *The Scientific Bulletin of Politehnica University of Timisoara, Transaction on Economics and Social Sciences (ranked according to CNCIS classification in Romania: D class);*
- *The Scientific Bulletin of Politehnica University of Timisoara, Transaction on Management. Economics Engineering. Transportation Engineering (ranked according to CNCIS classification in Romania: C class).*

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Faculty of Management in Production and Transportation

14 Remus str., 300191 Timisoara, Romania

E-mail: scientific.bulletin@yahoo.com

Web address: <http://www.mpt.upt.ro/>

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Editorial

Anca DRĂGHICI¹

The Editorial Board of the “*Scientific Bulletin of Politehnica University of Timisoara – Transaction on Engineering and Management*” (ISSN 2392-7364) kindly inform our community of contributors and readers that the journal has start a new episode with CrossRef (<https://www.crossref.org/>) and all articles having allocated DOI number.

Based on our collaboration with the UPT Library staff in 2022 and earlier 2023, we manage to allocate all articles with DOI being a Digital Object Identifier (see more information at: <https://www.doi.org/the-identifier/what-is-a-doi/>). This is a big new step for our journal and for this we would like to express special thanks to the UPT Library staff.

Furthermore, the 8th volume of 2022 (having 2 numbers) has been attentive checked by volunteers’ reviewers (members of the *Associated Editors and ither professionals*); because their careful and professional (volunteer) review work has a positive impact on the quality content of this volume. In addition, we appreciate the constant support of the *Research Center in Engineering and Management (RCEM)*² (from the Faculty of Management in Production and Transportation, Politehnica University of Timisoara, FMPT/UPT, Romania); RCEM provide a productive and positive environment through which we share ideas and knowledge between young people and seniors involved in research activities (formal or informal).

The current issue presents a collection of articles reflecting actual topics and research thematic in the field of sustainability, quality and production management, economics, work safety, and public administration. Romanian and foreign authors have been contributors of 10 articles that debutant and extensive studies, too.

The first paper, “*Contributions Regarding the Development of Supplier Relationship Management in the Automotive Industry*”, proposed by Gina PRODAN from Politehnica University of Timisoara, Romania) presents a research topic follows the changes produced in the Romanian Automotive Industry, considering the various problems it faces in recent years and proposes a new method of evaluating suppliers using a mobile application.

The second paper “*Land Grabbing in Romania*”

by Bianca ZABLATOSCHI, Mihaela VARTOLOMEI and Iudit BERE SEMEREDI (from Politehnica University of Timisoara, Romania) aims to raise awareness about land grabbing and its negative impact on EU countries and to find several measures to stop it.

The third paper presents a study entitled: “*Analysis of*

Good Forest Improvement Practices Applicable in Romania” by Lavinia-Felicia FUGA, Alin GAUREANU and Iulia-Maria OANCEA (from Politehnica University of Timisoara, Romania). The paper aims to emphasize how Romania can improve its measures for protecting the national forest fund through environmental policies and strategies.

The fourth paper entitled “*A Debate on Environmental Management Accounting*” by Roxana Mihaela SIRBU and Mihaela VARTOLOMEI (from Politehnica University of Timisoara, Romania). Their work debates are a relatively new tool for environmental management which considered the company’s internal costs, as it does not include the external costs of individuals, society, or the economic environment over which the company has no decision-making power. The debate focusses on two of the three milestones of sustainable development

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¹ Editor in Chief, Politehnica University of Timisoara, Romania, e-mail: anca.draghici@upt.ro

² Information are available at: <http://www.mpt.upt.ro/eng/research/research-center.html>

(environmental and economics dimensions), as they relate to an organization's internal decisional process.

Next article entitled: ***"The Gig Economy and Automation. A Brief Presentation with Discussions"*** by Cristian-Marian GAȘPAR and Mihaela VARTOLOMEI (Politehnica University of Timisoara, Romania) aims to present the Gig economy concept: which consist of and is determine by people who would no longer be hired directly from a company, but as free lancers working mainly on web-based platforms.

In the next article entitled: ***"Legal Aspects Concerning Prostitution"***, the authors: Cristian-Marian GAȘPAR and Caius LUMINOSU (Politehnica University of Timisoara, Romania) have presented a study which aims to draw attention to the phenomenon of prostitution both from a legal, social, and economic point of view. The study first presents the contemporary social phenomenon, followed by a brief history and the current situation.

"Visions on Green Management and Mimicry through Neuromanagement" by Ancuța-Elena PAVEN, Diana Florina ROBESCU and Ilie TAUCEAN (Politehnica University of Timisoara, Romania) have developed a study which aims to present a consistent literature review on green management and mimicry related to their implications and knowledge exploitation in organization management.

Then large group of authors (Delia ROZOVLEAN, Florin Constantin BOGDEA, Andreas DOBRE, Mircea ZAMFIRESCU from Politehnica University of Timisoara and Laura-Crina COCA from Technical University "Gheorghe Asachi" of Iași, Romania) present ***"The Current Study of Sustainability Approach in Technical Universities"*** a study related to the current state of involvement in the sustainable development of some universities that form the Romanian Alliance of Technical Universities (ARUT).

The next article entitled: ***"Using Six Sigma to Improve the Quality Rate of a Display Production***

Line in the Automotive Industry" has been developed by Rui Filipe DE CARVALHO and Simon VELLS from CESI Engineering School, Assat, France and Sabina POTRA from Politehnica University of Timisoara, Romania. By using the DMAIC model and a set of well-known quality tools, the present paper aims to exhibit a successful implementation of the methodology in the automotive industry, more specifically on improving the quality rate of a display production line.

In the next article entitled: ***"Ergonomics and Human Factors in the Cyber Age. The Case of Ergonomics and Human Factors Regional Educational CEEPUS Network"*** is developed by a group of authors that are team leaders of the universities and faculties partners in teh CEEPUS network. The paper reflects the ongoing activities and impact during the 2021 – 2022 academic year. Thus, the paper aims to present the achievements of the Ergonomics and Human Factors Regional Educational CEEPUS Network during the last two academic years (2020 – 2022) and the planned activities for the next period (2022 – 2023). The Network establishment and development is considered mature and could be a good practice example in the field of ergonomics collaborations by providing evidence of common activities and achievements that have conducted to the extension of the network and other project collaboration types of development.

The last paper presents ***"A Debate on Main Aspects of Safety Management and Ergonomics in Georgia"*** has been developed by Jemma SAAKYAN from Georgian Technical University, Tbilisi, Georgia, together with Anca DRAGHICI and Ilie TAUCEAN from Politehnica University of Timisoara, Romania. They proposed an overview and a debate with best practices about the specifics of safety management and ergonomics in Georgia. This study has been developed in the context of the Erasmus+ mobility of Jemma SAAKYAN at UPT.

Contributions regarding the development of supplier relationship management in the Automotive Industry

Gina PRODAN¹

Abstract –This research topic follows the changes produced in the Romanian Automotive Industry, considering the various problems it faces in recent years (Covid 19 pandemic, semiconductor crisis, lack of production capacity of the supplier, excessive and frequent fluctuations in demand from customers, lack of storage capacity) and proposes a new method of evaluating suppliers using a mobile application.

Keywords Supplier Evaluation, Automotive Industry, semiconductor crisis, mobile application

I. INTRODUCTION

The current problems in the Automotive and Components Manufacturing Industry are problems that the entities have had to deal with in the past, but on a much smaller scale. If until 2018 there were issues in terms of non-delivery of raw materials, starting with 2020 these problems have worsened. The simple fact that a supplier does not deliver an essential component (as the semiconductor is considered) has a major impact on the entire entity. When only one component is missing the finished product cannot be made or it will be an incomplete version. If that finished product is made on a dedicated production line, then production will also be stopped. If the period during which the material is missing continues, there is a possibility of stopping the production line. Also, in the context in which the other suppliers deliver the orders in accordance with the requirements transmitted by EDI there will be an overcrowding of the warehouse. An increase of uncertainty level will augment in turn the employees' level of stress, which may lead to more human errors therefore a strain in problem management. In this case, the emphasis should be on communication with all suppliers and the existing situations should be presented in a transparent manner to improve these situations. If until now the price was the main criteria for selecting suppliers, their evaluation being done according to the clear requirements of ISO 9001: 2015, in the current situation, things changed drastically, and the biggest

requirement of suppliers becomes the degree of flexibility concerning the delivery of raw materials. [2]

II. CURRENT SITUATION

The automotive industry is part of a well-structured system, based on clear regulations that operate according to standards imposed by the original equipment manufacturer [1, 2]. Today's companies have created global strategies to procure raw materials, components and labor from low-cost countries that are often located far from the countries they will be used in [3]. This means that they may have more options for selecting consumables and negotiating lower parts prices. Through this, they hoped to gain competitive advantages and secure sources of supply, but the great distance from suppliers and the complexity of logistics in global companies tend to create longer order delivery times and higher stock levels (which contradicts current requirements) [8, 9]. Businesses need to practice cost-effective philosophies, with the main goal being to move towards shorter delivery times and eliminate excess stock levels. Therefore, a difficult task arises in fulfilling both objectives [8].

In the context of aggravated uncertainty, suppliers must demonstrate their ability to manufacture and supply production parts that meet all relevant requirements when the customer needs them [10]. Thus, the concepts of flexible and reliable delivery have become essential for efficient production performance in all business lines, but especially in the automotive industry [7]. Suppliers should generally ensure the availability of specific stock volumes at predefined times and locations. They must use the same computer system as the customer to track deliveries and synchronize inventory processing [8]. Globally synchronized cooperation and communication with suppliers is important for achieving economic goals [4]. In addition to innovative delivery concepts, suppliers need to be able to realize classic concepts such as consignment stock, JIT and Kanban [2]. Requirements for suppliers are high and

¹ Politehnica University of Timisoara, Romania, gina.prodan@student.upt.ro

often change depending on the context, making their assessment considerably difficult [3].

Until 3 years ago, all entities involved in the Automotive Industry allocated significant resources to reduce the stocks' level, there were numerous more or less feasible projects that tried to reduce stocks and improve relations with suppliers [9]. At present, the continuing constraints of the supply chain when it comes to steel, semiconductors and transport in general have consequences for all entities. All these imbalances have led to undesirable effects: overcrowding of warehouses, shutdown of production lines, increasing the level of uncertainty, intensifying the special transports to customers, decreased profitability, and a lower degree of product availability [7].

If so far, agreements with suppliers have generally been negotiated to obtain the lowest possible price for the supplied products, the organizations making compromises regarding the location where the materials were procured (Malaysia, Singapore, Shanghai, Plymouth, etc.) having a delivery time of 12 weeks, now the situation has changed, and the priority is the availability and flexibility of the supplier to deliver the materials [2].

III. MAIN ISSUES IN AUTOMOTIVE INDUSTRY

The Automotive and Components Manufacturing Industry is facing material shortages, especially with semiconductors [11]. The current lack of semiconductors is the result of a combination of factors: a strong and accelerated demand for digital technologies, the long manufacturing life of the raw material that is in opposition to the JIT (Eng. Just in time-exactly on time), inflexibility and concentrated supply and in addition the COVID-19 crisis, as well as geopolitical tensions. Due to the widespread digitalization of the economy and society, the demand for semiconductors has grown sharply even before the pandemic (for example, in 5G phones and antennas, new video games, sensors and devices for the Internet of Things, etc.). The pandemic has exacerbated the situation and exposed the vital role of chips for modern economies and societies through a series of parallel developments. Semiconductor deliveries to Europe from East Asia have further slowed due to general supply chain problems caused by transportation restrictions imposed by governments around the globe to fight the pandemic [12]. Car manufacturers were among those who endured the brunt of the crisis. In early 2020, carmakers reduced chip orders as demand fell. Semiconductor factories have allocated the available capacity for IT equipment [11]. When vehicle demand returned at the end of 2020, semiconductor factories were operating at full capacity, leaving carmakers with waiting times of up to a year or more. As a result, several car factories were closed in Europe and around the world, and workers were laid off [76]. European carmakers have called for an increase in EU chip production capacity and a reduced dependence on imports [2, 3].

Today, the Romanian car industry produces predominantly for export and is controlled almost entirely by foreign capital. In order to benefit from low labor costs, companies have invested mainly in manual processes, with a low level of complexity and technology. Romania serves mainly as a platform for assembling products designed for western states [4-8].

The semiconductor sector is characterized by an intense research and development activity, the companies reinvesting over 15% of their revenues in research in state-of-the-art technologies. Semiconductor production requires many unique materials, chemicals and sophisticated equipment provided by specialist suppliers for each stage of the manufacturing process.

According to Business and Consumer Surveys (BCS) the material crisis has grown rapidly in importance during 2021, overcoming both the demand deficit and the labor crisis (Fig. 1) [11].

In July 2021, the European Commission launched the Industrial Alliance for Processors and Semiconductors to identify current gaps in microchip production and technological developments needed for companies and organizations to thrive, regardless of their size. The Alliance will help stimulate collaboration between existing and future EU initiatives, as well as play an important advisory role and provide a strategic roadmap for the Chips for Europe Initiative together with other stakeholders [13].

Until now, 22 Member States have committed, through a joint declaration signed in December 2020, to work together to strengthen the European value chain of embedded electronics and systems and to strengthen peak production capacity [11]. The new measures will help Europe meet its 2030 digital decade targets of 20% of the global chip market share by 2030 [13]. After four months of substantial gains from March to June 2021 - the result of last year's low base of comparisons caused by pandemic bottlenecks - EU registrations showed a reverse trend in the third quarter of the year [11].

The EU car market contracted by 23.1% in September, marking the lowest number of registrations for a month since September 1995. This drop in sales was largely due to the shortage of semiconductors [11].



Fig. 1. Factors limiting production in EU industry.

The substantial loss in September has also affected the EU's performance so far, which for the first three quarters now stands at 7.5 million units, up 6.6% from the same period in 2020 [11]. Despite the stimulus of demand and the need to rebuild stocks after last year's blockade, production of passenger cars in the European Union still struggled to pick up, as the supply deficit deteriorated further during the year [12]. EU car production increased by just 3.1% in the first nine months of the year, reaching 7.6 million cars built, which is still 3 million units less than pre-crisis 2019 volumes [13].

IV. MOBILE APP: EVALUATE YOUR SUPPLIER

In order to improve the communication between supplier chain was created the mobile application called: Evaluate your supplier. The main objective of this application is to improve the flow of communication with suppliers in the current conditions: the negative effects produced by the Covid 19 pandemic and the semiconductor crisis on the Romanian Automobile and Auto Components Manufacturing Industry, a particularly important segment for the study due to its economic, social, and technological dimension.

The application can be downloaded from both phones using Android operating system and those using iOS. This application was created on the openasapp.com platform and is divided into several sections:

1. Suppliers

In this section you can view all suppliers and find general information about them such as: supplier name, logo, address, country of origin. The information appears as a list and with the navigation up and down you can view the complete list. Additionally in this section you can filter the information and view it according to certain criteria such as: country of origin, number of deliveries, space occupied in the warehouse, etc. The viewing mode can change and we can also see their data in the form of graphs. The figure below shows the display mode (Fig. 2.):

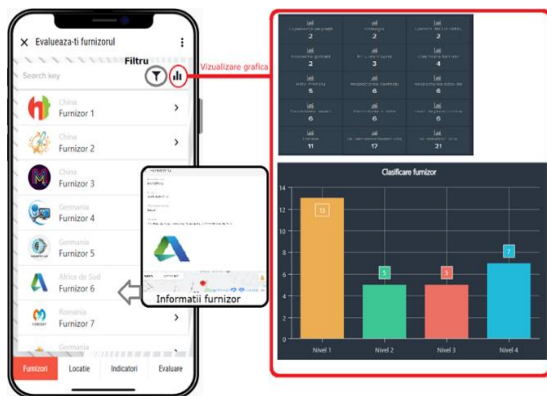


Fig. 2. View the Supplier section in the application.

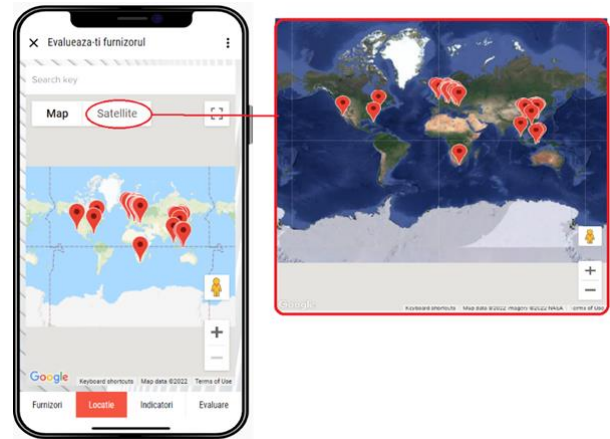


Fig. 3. View the section Location in the application.

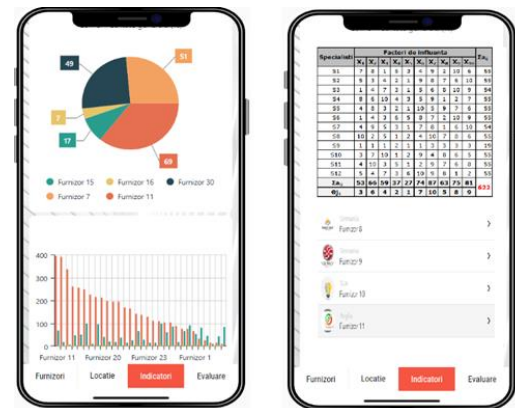


Fig. 4. View the section Key performance indicators in the application.

2. Location

In this section, the addresses of the suppliers are marked on the world map to have a better perspective on the distance between the supplier and the buyer. Google Maps data is used for more accurate information. The locations can be viewed in both map mode (MAPS) and satellite mode (SATELLITE), the images being taken from NASA satellites in 2022. Being interconnected with Google Maps all their updates are transmitted to the application through updates regularly. The figure below shows the view mode (Fig. 3.).

3. Key performance indicators

This section is the largest and most important section providing an overview of the vendors according to certain pre-established criteria. The information can be viewed in tabular form, list, or graphs. The most representative viewing mode is the one in the form of a graph (Fig. 4).

4. Rating

Through this section, the supplier can be evaluated according to several main criteria as well as secondary criteria (Fig. 5).

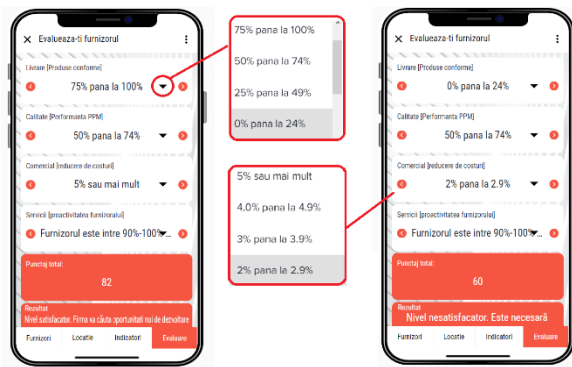


Fig. 5. View Evaluation section from the application

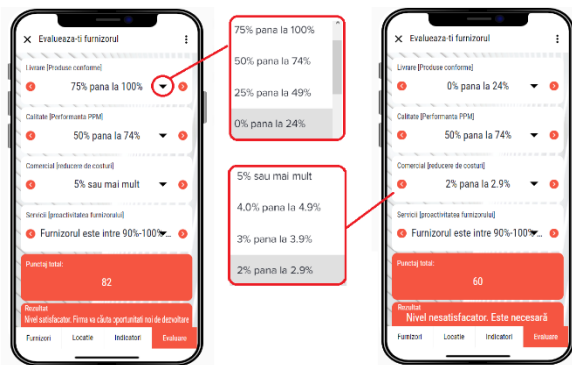


Fig. 6. View Questionnaire section from the application.

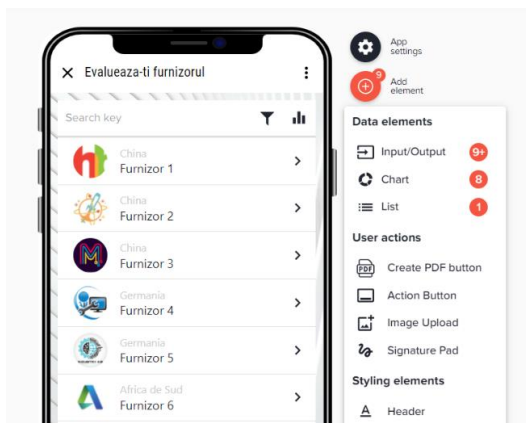


Fig. 7. View the openasapp.com interface.

5. Questionnaire section

Questionnaires can also be completed within the application. Response time is very short. When the questionnaire was completed, the user receives a notification to update the application. The questionnaire appears in digital format and after completion there is a button through the houses can be sent as a PDF to the creator (Fig. 6).

The operation principle of openasapp.com site consists in transforming the Visual Basic programming language that underlies Excel into a proper application.

The site interface is intuitive with elements on the right side through which data can be entered in the application (Fig. 7).

In the 'Evaluate your supplier' application, the graph is presented through a comparison made between

the number of orders delivered and the orders sent via EDI. The data obtained was generated through the SAP transaction called MB51 having completed the fields: factory (plant), supplier (or Vendor), type of operation (or Movement type) and time (Posting data). After the data has been generated, an excel table is inserted by selecting the data for the graph. The lines of code in generating an excel chart are:

```
"Sub Supplier Chart ()
Dim cht As Chart
Let's be The Series
Set cht = Sheets ("Sheet1").
ChartObjects.Add (0, 0, 300, 300) .Chart
With cht
.ChartType = xlBarClustered
Set ser = .SeriesCollection.NewSeries
With ser
.Name = "Average Delivery / Month"
.XValues = Array ("Vendor 1", "Vendor 2",
"Vendor 3", "Vendor 4", "Vendor X")
.Values = Array (4498291, 4451255,
4160684, 3014186, 1889044)
End With
Set ser = .SeriesCollection.NewSeries
With ser
.Name = "Average EDI Commands / Month"
.Values = Array (5198291, 4851255,
4760684, 4014186, 1989044)
End With
End With
End Sub "
```

When the excel file containing the chart is uploaded to openasapp.com, it enters the chart into the application.

V. FIELD OF APP USE-EXAMPLES

The app can be used to establish the occupied warehouse space and keep in touch the deliveries from suppliers.

If, for example, the warehouse has a simple storage configuration with 200 pallet locations, the non-delivery of a material involves the occupation of 159 pallet locations (assuming that the warehouse is normally occupied at a capacity of 80%). Not having all the materials available, the production will not be able to produce the finished product and the materials will be kept in the locations in the warehouse. If the material delay persists longer and the other suppliers will send the materials according to the requirements sent by EDI, then the warehouse will become overcrowded, and the company will need additional space to store the new raw material. As the delivery time is 12 weeks most likely the next 12 deliveries are either in transit or awaiting the customs clearance process. In the current context, the storage models designed so far have become insufficient. Three different solutions are developed for these situations:

- Increase the basic capacity to cover all peak demand throughout the year;
- Use of short-term rental of additional space in another external warehouse to add capacity for peak demand;
- The use of on-demand storage at another warehouse belonging to the same concern to address both situations of insufficient capacity and overcapacity.

With the application we can offer the supplier an accurate view regarding the level of stock from warehouse. Also, could be done statistics regarding the usage of the warehouse space for each supplier, level of material usage or determination of the factors that led to the excess stock in warehouses.

In below figure (Fig. 8) was made a comparison regarding the factors that led to the excess stock in the warehouses between 2018 and 2021, where significant increases are observed:

Development and testing of a real-time supplier evaluation model, agreed by both links of the chain, to improve the flow of communication with suppliers. The application can be used to evaluate suppliers according to several criteria: level of sales (Fig. 9), delivery service (Fig. 10), forecast vs deliveries (Fig. 11).

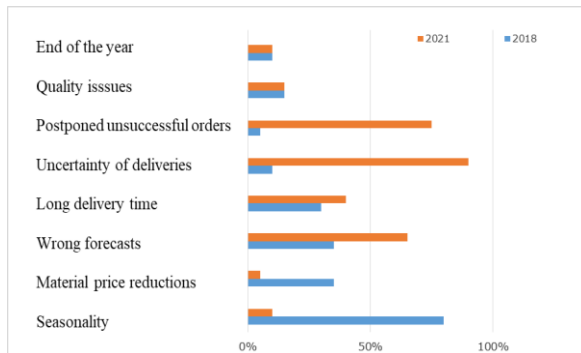


Fig. 8. Factors that led to excess stock



Fig. 9. Level of sales

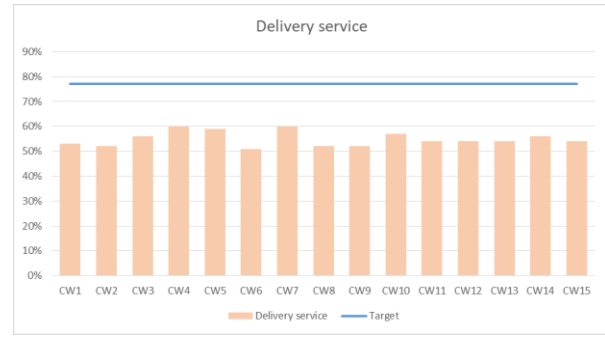


Fig. 10. Delivery service

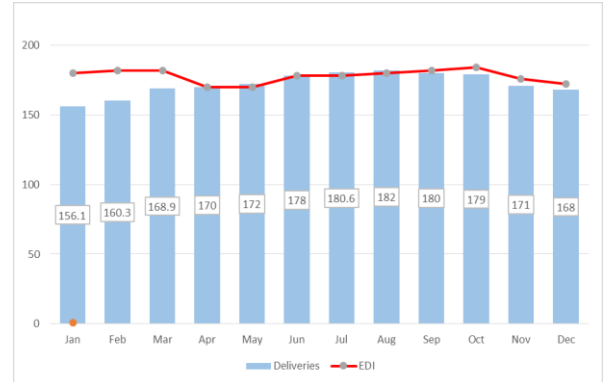


Fig. 11. Forecast vs deliveries.

VI. CONCLUSIONS AND FINAL REMARKS

The creation of the application appeared as a necessity in the current crisis. Upon receipt of the assessment information, the supplier shall begin to implement the corrective measures or requirements. Before analyzing how to implement, the provider must first know in detail what needs to be improved. Suppliers need to assess when they can meet the requirements and when they can come up with improvements. The application can be expanded by adding a status tracking section with real-time feedback improvements. Also, in this section you can offer some advice and counseling for points where not everything is clear.

This study focuses mainly on the performance measured according to the performance indicators in the Automotive and Components Manufacturing Industry. This application can be customized to the needs of each enterprise in other similar industries. The only condition is to have quantifiable performance indicators.

Among the main advantages identified can be listed:

- The application can be downloaded on both phones that use Android operating system and those that use IOS
 - The application interface is intuitive and easy to use;
 - Ensures a competitive advantage in terms of costs, technology and minimum resources used;

- Everything that happens when a user enters the application is in accordance with the latest update;
- The phone is available at any time, being one of the devices used daily;
- Updates can always be made, which provides a permanent traceability of weaknesses;
- Evaluation can be done much easier.

A major disadvantage would be that being exposed to the online environment the application can be infected if there is no antivirus program on the phone. Also, if your phone is connected to an unsecured wireless network, such as in restaurants or cafes, data in the application may be intercepted by others. There are many factors that can independently affect the user experience, including the speed of improving the negative side effects obtained from inadequate management.

• “Evaluate your supplier” application. It is divided into 5 large sections in which details are presented related to:

- General identification data of suppliers
- Their location,
- KPIs
- Evaluation section
- Questionnaires.

Development and testing of a real-time supplier evaluation model, agreed by both links of the chain, to improve the flow of communication with suppliers.

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Land Grabbing in Romania

Bianca ZABLATOSCHI¹, Mihaela VARTOLOMEI², Iudit BERE SEMEREDI³

Abstract — This paper aims to raise awareness about land grabbing and its negative impact on EU countries and to find several measures to stop it. The first chapter defines the phenomenon of land grabbing, it presents its history, the factors that determine the occurrence and/or perpetuation of the phenomenon, and the effects. In the second chapter, the paper focuses on case studies of land grabbing in Romania and on the actors and institutions involved. Further on in this chapter, the phenomenon of land grabbing is analysed from the socio-economic, socio-cultural, environmental, and political points of view. The third chapter studies land grabbing from the legal point of view and land law in force in Romania. The last chapter offers several measures to stop this land-grabbing phenomenon. The research ends with the conclusions of the authors.

Keywords: Agricultural land grabbing, policies, efficiency, corruption, effects, land fragmentation, human rights

I. INTRODUCTION

Land Grabbing is a serious problem affecting the environment, the economy, social welfare, and human rights. Although this problem has taken over the entire globe, no definition encompasses it entirely. Generally, the term land grabbing is used to describe the purchase or leasing of large areas of land by both public and private owners. Land grabbing belongs to the category of issues considered relevant to European institutions such as the European Parliament and the European Social and Economic Committee (Boruss, S., MA, R., & BM, S.A., 2015). Most of the time, however, the phenomenon is carried out through existing gaps in national and international policies, so this practice cannot be considered illegal or illegitimate (Boruss, S., MA, R., & BM, S.A., 2015).

1.1. The Concept of Land Grabbing

Land Grabbing can be defined as the phenomenon of large-scale land acquisitions, the purchase or lease of large land areas in developed and especially developing countries by national and transnational companies, foreign governments, and individuals (Boruss et al., 2015).

The term has been used before, but as it is used today, it primarily refers to the rush for large-scale land acquisitions that have taken place since the global food price crisis of 2007-2008. The food price crisis led to a dramatic peak in large-scale agricultural investment, evoking fears of food security in the developed world and causing new economic opportunities for agricultural investors and speculators. Most of these agricultural investments are in the southern part of the world, 70% in sub-Saharan Africa, South-East Asia, and Latin America, have a foreign nature, and take place for crops and biofuel production (Pezzi, 2020).

Initially welcomed as a new path to agricultural development by investors and some developing countries, investments in land have been criticized by many actors of civil society, government, and multinational actors for various negative effects it has had in many cases on local communities (Pezzi, 2020).

The huge profits from Land Grabbing are one of the factors that stimulate the perpetuation of this habit, especially in states with weak governance in the land sector (Boruss et al., 2015).

1.2. A Brief History of Land Grabbing

The phenomenon of Land Grabbing has existed for a long time, beginning with the conflicts between tribes over land ownership and reaching our times, in the form of globalization and economic integration. This tendency to seize as many territories as possible, to have control over land properties, and to have control over subsoil riches has found new ways of operating in the European Union (Constantin et al., 2017).

Firstly, relatively low land prices in the Eastern European Member States (compared to Western Europe) represented a major incentive for investors to acquire agricultural land in these countries (Kay et al., 2015). Agricultural land prices are not regulated by law; they vary, so in 2009 while the nominal price of agricultural land was about 1000 euros in Poland, in France it was five times higher, in Spain it was ten times higher, in Denmark it was twenty-six times higher, and in the Netherlands, it was forty-seven times higher than in Poland (KU Leuven & CEPS, 2013).

¹ Politehnica University of Timisoara, Romania, bianca.zablatoschi@upt.ro

² Politehnica University of Timisoara, Romania, mihaela.vartolomei@upt.ro

³ Politehnica University of Timisoara, Romania, iudit.beresemeredit@student.upt.ro

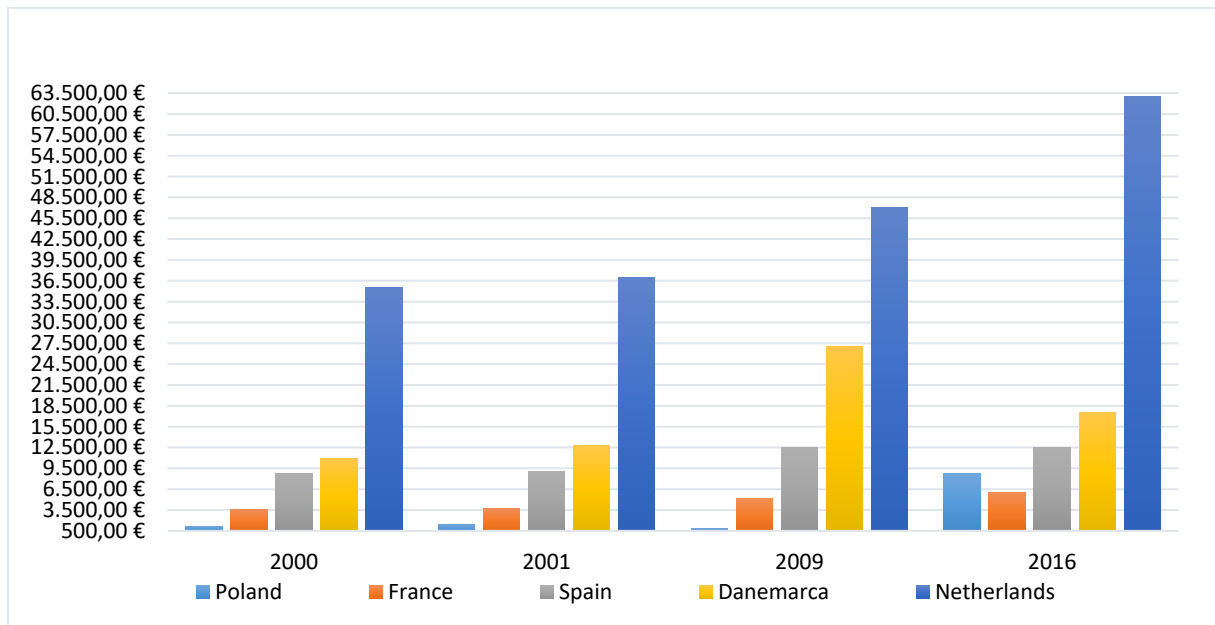


Fig. 1. Agricultural land prices(euro/ha)

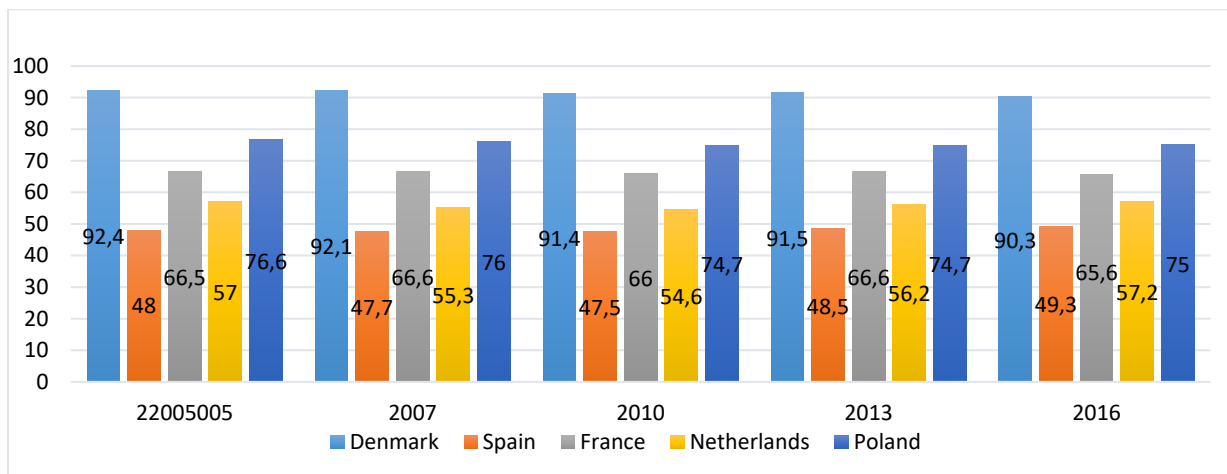


Fig. 2. Percentage of arable land out of total used agricultural area

In Europe, there is a correlation between the (declining) number of agricultural production units and the number of people employed in agriculture. For example, between 2005 and 2010, the number of production units decreased the most in Eastern European countries, especially in the Baltic states (Estonia, Latvia, and Lithuania), and at the same time, the region saw the largest decrease in the demand labour force (8.9% in Bulgaria and Romania and 8.3% in the Baltic states annually).

However, in Ireland and Malta, the number of agricultural enterprises has increased, and implicitly the demand for agricultural workers has also increased (Nurm, K. 2015).

In 2005, in Denmark, 92.4% of the total agricultural area used was arable land. Over the years, the percentage of arable land has been decreasing, in 2016 reaching a value of only 90.3%, which means that the size of the intended land destined for food production in Denmark has been reduced, while the population remains the same. The loss of agricultural land is largely due to land degradation, such as erosion, which

occurs when soil components are moved from one location to another by wind or water. Agricultural land is also being lost as it is converted to other uses such as highways, housing, and factories (Problems in Agriculture: Loss of Land and Decreased Varieties, 2013). In Spain in 2005, a percentage of only 48.0% of the total agricultural area used was arable land, which means that approximately half of the total agricultural area used was not intended for food production, but included pastures, gardens, yards, etc. From 2005 to 2010, this percentage of 48.0% arable land from the total agricultural area used decreased slightly and reaches the value of 47.5% and will increase until the year 2013 to the value of 48.5% and even reach the percentage of 49.3% arable land in 2016.

Therefore, investors will always choose to invest in the agricultural land of those countries that have the most fertile and fruitful soils but at the same time have the lowest purchase price. For example, if in Poland the purchase price of agricultural land is 1000€/hectare and in Denmark, the price of agricultural land of the same type is twenty-six times higher than that in Poland, it is

obvious that an investor would choose to acquire the land in Poland rather than the one in Denmark, according to the principle of efficiency (getting as much as possible with the same resources or getting the same result with as few resources as possible).

Secondly, post-communist land privatization and land restitution programs have not had very good results in many Eastern European countries because they have not brought the desired benefits to the beneficiary investors and especially because small farmers have been discriminated. Discrimination against small farmers is rather a disadvantage due to the transition to the market economy and consists of the fact that they could no longer obtain land or enter the economic sector without having sufficient capital compared to the capital of large companies.

The result of these processes was the emergence of dualistic agrarian structures in which land use is both concentrated and highly fragmented. This paved the way for agricultural land grabbing, as a new class of private landowners with significant capital that can easily outcompete smaller farmers who must compete on economically substandard land (KU Leuven & CEPS, 2013). At times, measures taken to correct this structural dualism and increase the economic competitiveness of small farms have led to continued land grabbing under the guise of "land consolidation" (Kay, 2016).

1.3. Factors that determined land grabbing

Agricultural land and access to water are the basis for food production. The degree of food self-sufficiency of states depends on various factors; a fundamental condition consists in any case of the existence of sufficiently large agricultural areas and the right of states to regulate the ownership and use of agricultural land (Nurm, 2015). The following factors encourage land grabbing (as presented by Nurm (2015)):

- Increasing globalization and the associated principle of free movement of capital;
- Population growth and urbanization;
- The growing demand for food;
- Increasing the demand for bioenergy;
- Growing demand for natural resources (fibers and other wood products);
- The negative side of agricultural and environmental policy;
- The possibility of being able to speculate on food products on the international or at least European market;
- The potential to speculate on the increase in the value of agricultural land and future state aid;
- The efforts of large investors to put the capital released after the financial crisis of 2008 in agricultural land as a safe investment.

Corruption and formal compliance with legal regulations were also factors that contributed to a large extent to the acceleration of the Land Grabbing phenomenon in the states of the Eastern region of the

European Union. Large-scale land acquisitions often take place in developing countries, which are also known to be conducive to corruption caused by weak institutional frameworks (Franco, 2012). According to estimates from the Land Matrix database, these large-scale land acquisitions (committed and intended contracts) amount to 55 million hectares of land bought or leased worldwide between 2000 and 2011, and numbers are growing (Franco, 2012).

To better understand the role of corruption in land transactions, it should be noted that the relationship between corruption and foreign direct investment (FDI) is unclear. On one hand, it can introduce inefficiencies that discourage FDI and ultimately reduce economic activity. On the other hand, corruption can also be supported to stimulate FDI, meaning that "corruption facilitates beneficial exchanges that would not otherwise have occurred. In doing so, it promotes efficiency by allowing individuals in the private sector to correct pre-existing failures of various types of government" (Franco, 2012).

Previous research has shed some light on the factors that govern countries' and corporations' demand for land in foreign countries. In many cases, such investments are resource-seeking, meaning that they involve "investing in a host country market to achieve cost minimization by obtaining resources that are either too expensive to obtain or unavailable in the local market." That is, the objective of many transnational commercial land transactions is to produce and export food crops and biofuels in the home countries of large-scale investors (Borras and Franco 2012) and to gain access to water, and other raw materials (for example minerals, wood). Often, the goal of large-scale land transactions is thus to ensure food security (which may be jeopardized by population growth or dietary changes) or the supply of energy or raw materials important for industrial production.

Given these motivations for foreign investors' partial land acquisitions, it is not surprising that some authors show that the acquisition of foreign land for large-scale agricultural investment is strongly determined by the agro-ecological potential in the target countries of land deals (e.g., in terms of land availability and productivity) (Bujko et al., 2016).

1.4. Effects of land grabbing

The phenomenon of land grabbing brings with it a series of effects and consequences, both positive and negative (Akowuah, 2016) as presented in the following.

1. Positive effects:

- More Jobs are created;
- Economic growth;
- The infrastructure provided by the investing companies;
- Development of communities over time.

2. Negative effects:

- Abuse of human rights;

- Loss of livelihood;
- Flows and pollution of water bodies;
- Environmental degradation.

It is difficult to track and record the exact extent of land grabbing by EU corporations, as many of these transactions remain in institutional gray areas and make it difficult to establish precise categories. A very good example is that situation where a corporation buys goods from companies with a certain reputation abroad, those goods come from land taken from villagers. The closest way to understanding rough measures of land grabbing is to track data through the Land Matrix, a database of land tenure statistics established by the International Land Coalition (ILC) and a consortium of organizations, which is currently the largest land acquisition tracking initiative in the world. A Land Matrix report describes how 83.2 million hectares of agricultural land in developing countries amounting to 1.7% of the global total changed hands, resulting in 1217 major land transactions (Nurm, 2015). In any case, even the Land Matrix is in constant flux. For example, the definition of what constitutes a case of land grabbing has been narrowed, with the effect that many land transactions and the corporations involved are left out so that the true extent of the phenomenon is underrepresented. It is still a useful tool, if its limitations are considered (Borras et al., 2020). Like any of the issues studied and analysed globally, the phenomenon of land grabbing has a starting point, namely the small farmers. Small farmers form the basis of European agriculture, they have some positive effects on the whole community of the European Union. The positive effects produced by small farmers are:

- Strengthens food security - this is possible through the abundant production of healthy food of known origin;
- Support food sovereignty - by building local markets and shorter food chains from producer to consumer that reduce dependence on global markets and vulnerability to price shocks;
- Protects the environment and local biodiversity - by practicing an unconventional, diversified form of agriculture;
- They bring dynamism to rural areas, generating jobs and supporting the life of the rural community based on local cultures and food traditions.

The opinion of the European Social and Economic Committee confirms that small farmers are threatened by the consequences and effects of the problem of land grabbing and land concentration. Agricultural land provides the basis for food production and is therefore the condition for ensuring food security by Article 11 of the United Nations International Covenant on Economic, Social and Cultural Rights and Article 25 of the Universal Declaration of Human Rights (Nurm, 2015).

Land sovereignty is the right of working people to have effective access, use, and control over land and the benefits of its use and occupation, where land is

understood as a resource, territory, and landscape. Land sovereignty is an important aspect that covers several elements, including land grabbing. Land sovereignty is both a call to action against a corporate renewal and a global (trans)national drive to close off the commons and an affirmation of the need to bring the land closer to people; supporting working people and their human right to control the land. Land sovereignty goes beyond viewing land only as a resource and considers land both as territory and as landscapes. It embraces the struggles of indigenous movements, rural workers, urban activists, and social movements in the North and South, who have sometimes been excluded from traditional land reform campaigns. Land sovereignty encompasses a pluralistic understanding of property rights – encompassing community, state, and/or private property rights – privileging the commons and recognizing the importance of state property while confronting the contradictory role of the state in land conflicts. Furthermore, land sovereignty is based on redistributive land reform, aiming to go beyond it by supporting land restitution for people who previously benefited from land reform and whose lands were displaced and dispossessed due to more recent land grabbing and by supporting other policies land whose redistributive content can be shaped by mass struggles (i.e., forest land reallocation policies, community-based forest management, property reform, and housing reform). In addition, land sovereignty connects with popular demand and food sovereignty enabling movements for reciprocal and synergistic interaction between them (Franco, 2012).

II. LAND GRABBING IN ROMANIA

Following Romanian law, in 2011 the rural part of Romania constitutes 87.1% of the country, comprising 47.2% of the population, i.e., 8.98 million inhabitants (out of a total of 20 million inhabitants). According to the definition by the Organization for Economic Cooperation and Development (OECD), 59.8% of Romania is rural, 39.4% is represented by intermediate areas and only 0.8% represents the urban area (Eurostat 2012; Boruss et al., 2015).

At the end of the Second World War, Romania fell into the sphere of influence of the USSR. In a relatively short time (1944-1947), a soviet-inspired communist regime was established. The seizure of power by the communists produced major transformations in Romanian society at that time (multi-parties was banned, the industry was nationalized, and land collectivization began). We will continue to refer to this last event (Bărbulescu et al., 2007). The phenomenon of agricultural collectivization was treated as a fundamental component in the rise of communism. The standardization of society also involved the transformation of village life into an industrial model, much more ideological than economic.

Three main periods can be seen, without being considered absolute time intervals:

1. 1949-1953 - the violent implementation of collectivist structures;
2. 1953-1956 - a slight relaxation of collectivization policy - the tax burden is eased;
3. 1957-1962 - acceleration of collectivization through violent means.

The collectivization campaign was officially initiated together with the plenary session of the Central Committee of the Romanian Workers' Party from March 3-5, 1949 (Lungu, 2008).

Agricultural collectivization had an important place in this strategy, which was like the Soviet model. The land reforms of 1945 were inspired by the Land Decree drawn up by the Bolsheviks in 1917. They considered the attraction of the peasants to the communists and the destruction of the political enemy - that is, the big landowners. These things also happened in Romania, through the agrarian reform of 23rd of March 1945, carried out by the communist government Petru Groza. This government expropriated 1,468,000 ha of which 1,109,000 ha were allocated in complete or complementary lands to 917,000 peasants.

Between 1945 and 1949, through agrarian reform, state agricultural farms and agricultural production cooperatives were formed. State farms are a form of collective farming where management is done by the state, while historically cooperatives have been the main institutional and organizational tool through which independent farmers have been able to resist market power owned by local and transnational traders. They also serve to shorten the supply chain, allowing producers to integrate most or all their processing and marketing processes into one or a few steps, thus enabling substantial savings in transactions and other intermediate costs (Tortia et al., 2013).

In the post-war period, the Romanian state collectivized ("the process of collectivization appears in fact as a real war against the peasantry.

This war was based on the principle of class struggle, through which the party-state tried to break the solidarity of the peasantry, to fundamentally transform the structure social engineering of the rural world and subordinating it to his plans for social engineering.") agricultural land and agricultural labour (CPPADCR, 2006).

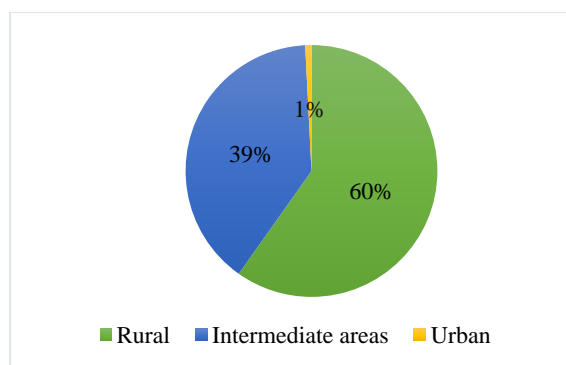


Fig. 3. The situation in Romania, 2012.

The communist period promoted the industrialization of urban areas, resulting in a large rural exodus. In the late 1980s, Romania was divided into urban areas inhabited by industrial workers and rural areas, where large agricultural units provided jobs for people who had lost their lands. In the region of Moldova and Muntenia, the main agricultural units were state farms, while in the rest of the country agricultural cooperatives dominated, concrete cases being the plains of Transylvania and Banat. In 1989, state farms and cooperatives represented 90% of Romania's used agricultural area (Bouniol, 2013).

After the Revolution of December 1989, which ended communism, de-collectivization led to the fragmentation and privatization of land. Cooperatives and state farms were then abolished very quickly. The cooperatives, which accounted for two-thirds of the arable land in 1989, were dismantled by the Land Fund Law in February 1991. The land was divided into many small plots that were redistributed to the former owners and those members involved in agricultural cooperatives. State farms were dismantled by Law no. 15/1990 and became commercial companies or autonomous kings. In the early years, these companies were formally seen as private, but had only limited autonomy, because the state held 70% of their capital (through ownership of shares or shares) (Bouniol, 2013).

Private investments in the agro-industrial sector were legalized starting in the 1990s. The land market in Romania was not yet open to the rest of Europe at that time, so the first to own considerable amounts of land were Romanians; Art. 68 of chapter V of the land fund law no. 18 of February 19, 1991,(1) "Physical persons who do not have Romanian citizenship and domicile in Romania, as well as legal persons who do not have Romanian nationality and headquarters in Romania, cannot acquire ownership of the land of any kind through deeds between vineyards." Many state farms and agricultural cooperatives were bought by former Romanian officials (the vast majority of high-ranking) who took full advantage of the land privatization process to become owners (Bouniol, 2013).

After the 1989 Revolution, the agrarian structure was organized around the small-scale exploitation of individual plots of land by peasants and around large private production units owned by the state. The first individual farms and family associations consisting of more than 20 million plots of land represented 65% of the used agricultural area of Romania.

In 2013, 99.2% of farms had no legal status, so it is not known exactly whether they are an individual or family subsistence plots. In 2010, the average size of these farms was 3.5 ha while the average size of holdings with legal status was 191 ha (General Census of Agriculture, December 2010 – January 2011). At both ends, the smallest farms are less than one hectare, and the largest cover tens of thousands of hectares of agricultural land (Bouniol, J. 2013).

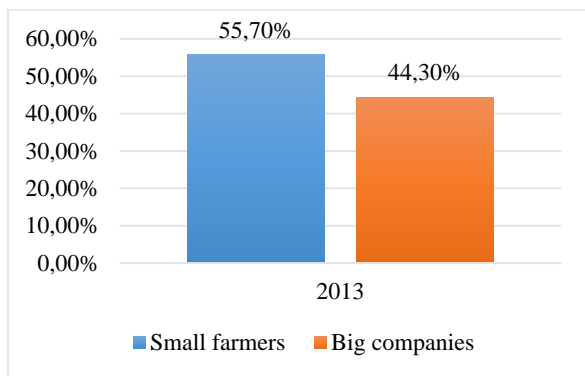


Fig. 4. Landowners of Romania in 2013

According to the Romanian Institute of Statistics (RIS), in 2013, 99.2% of small farmers work 55.7% of the land, while 0.8% of large companies work 44.3% of the land.

The average area of a peasant farm (owned by people) was 2.02 hectares and accounted for 55.7% of the country's agricultural area, while company-owned agricultural enterprises averaged 207.49 hectares and accounted for 44.3% of the Romanian agricultural area (INS, 2014).

2.1. Actors and institutions involved in the process

Behind most large-scale agricultural projects is a network of global actors who make the project possible. These actors include banks and companies that finance the project and companies that buy the products grown or processed by it.

All these actors are necessary for the success of the project and all aim to gain a profit from it in one way or another (Borras et al., 2020).

The main entities that control the land in Romania, in addition to the several hundred thousand hectares owned by domestic companies, are the following:

1. Small farmers: usually, they do not have enough own funds, nor do they have access to bank loans to pay their share of the modernization costs. With banks reluctant to lend them money, the investment capacity of small farmers remains low. Thus, it is often impossible for them to purchase equipment to improve efficiency or to meet up-to-date standards. Therefore, the local populations are still diminished and neglected in the agricultural sphere, which does not constitute any obstacle for multinationals and land grabbing (Heubuch, 2016);

2. Banking institutions, investment funds, pension/insurance funds: mostly buying very large areas of land (ranging from 3000 ha to 40000 ha and even more) for speculative purposes, international banks or investment funds register by usual subsidiaries or sister companies in Romania through which land acquisitions and land consolidation begin. Betting on the increase in land prices, the consolidated plots are planned to be sold in 10-20 years. The holders usually do not engage in agricultural exploitation and lease the land to other companies (foreign or domestic).

The whole process is highly non-transparent and incites corruption at all levels (lease contracts are often linked to local civil servants, and preferential companies). Examples: Rabobank, Generali (Italy), Spearhead International (United Kingdom), Black Sea Agriculture (United States of America) (Heubuch, 2016);

3. Private multinational companies: This category includes multinational companies especially from Western Europe (but not only) attracted by the investment opportunities presented by the host country. Romania is usually not the only destination for these companies, many of them also invest in African or South American countries. Examples: Bardeau Holding (Austria);

4. Private investors from abroad: Investors in this category represent natural persons from other EU countries or from outside the EU who invest their capital in Romania, registering a company in the country, through which they buy/rent land. Many of the companies are developing vertically, having businesses in other sectors of the food chain besides manufacturing, or are very export oriented. The investment patterns are mostly the same as for the category mentioned above, but usually, these actors own less land (200 - 4000 ha). Example: Yves Grasa (France);

5. Domestic private investors and companies: Taking advantage of the post-communist uncertainty over land ownership and the lack of government vision since the early 1990s, these actors were the first to access large tracts of land. The acquisitions include large communist farms and communal lands and involve several well-known Romanian oligarchs. Several cases with the highest concentrations of agricultural land can be listed here. Examples: InterAgro Holding (Ioan Niculae - 55,000 hectares), Racova Group (Adrian Porumboiu - more than 40,000 hectares);

6. Multinational companies trading agricultural commodities (international traders): Highly export-oriented companies that usually control land through contract farming and work with all the actors mentioned above. Having the most agricultural storage facilities, they also have crucial influence and control over commodity prices in Romania. Examples: Cargill (20 industrial silos), Bunge (association with Prio Foods - Grupo Martifer in biodiesel plants);

7. Development finance institutions (DFIs) are important actors in land grabbing, namely as financiers of land offers and investment projects. DFIs are specialized development banks that are mainly owned by national governments and contribute to the implementation of the latter's external development and cooperation policy. However, information about DFI activities is not readily available to parliaments or the public. DFIs invest their capital and can obtain additional sources of capital from national or international development funds and the private capital market. They can also benefit from government guarantees, which ensure their solvency.

8. In addition to the previously listed actors, in Romania there are associations - ecoruralis (the association of Romanian peasants), and other non-governmental organizations, as well as the Ministry of Agriculture and Rural Development (MADR).

2.2. Analysis of the phenomenon from a socio-economic, socio-cultural, environmental, and political point of view

1. Analysis of the phenomenon from a socio-economic point of view

Romania is a predominantly agricultural country, where agriculture provides an occupation for up to 30% of the population. However, land grabbing forces people to leave the countryside, generating a trend already well known in Western countries of rural exodus. The problem of the aging population and migration of young people was already an existing problem in rural areas, but land grabbing accentuates it even more. When land is accumulated for agro-industrial purposes, the high level of mechanization usually results in a wave of unemployment. Therefore, rural areas are under threat. The country's high export rates generate food insecurity, social vulnerability, and dependence on imports that low-income people cannot afford. The emphasis on export reflects how neglected Romanian rural needs are. Land grabbing is not only controlling land but also other resources. With land concentration, local communities lose access to the land and thus to the natural resources that traditionally support their livelihoods. Local communities lose their representation and independence and the whole situation generates shortages (Boruss, 2015).

2. Analysis of the phenomenon from a socio-cultural point of view

The phenomenon of land grabbing leads to the depopulation of rural areas by peasants and the loss of knowledge and traditions when values and practices they begin to resemble the consumer-driven and urban production system. Land conflicts are frequent in rural areas through residents and their relationship with external institutions. However, land ownership changes and fluctuations in land prices create additional problems. In addition, prices are rising and access to land is becoming prohibitive for small farmers. New entrants to agriculture (young farmers) have difficulties accessing land these days.

3. Analysis of the phenomenon from the environmental point of view

Changes in land ownership cause social uncertainty and environmental degradation. There is little focus on the economic scope and short-term benefits, thus neglecting social and environmental sustainability and not considering the long-term costs of land grabbing. Land consolidation is often linked to the establishment of monocultures, thus causing the loss of agricultural biodiversity and natural heritage. However, in Romania, there is a lack of awareness regarding the ecological impact of intensive agriculture that the accumulation of land generates (Boruss, 2015). The

use of fertilizers or pesticides causes soil depletion, water pollution, biodiversity destruction, and environmental degradation in general, to the same extent that intensive agriculture generates negative effects around the world. The depopulation of peasants generates the abandonment of the agroecological approach, which leads to environmental degradation.

In addition, the artificialization of the land is a long-term risk that is not considered. Using the land outside of agricultural purposes is a fact that threatens the food sovereignty of the country; unplanned development can destroy specific ecosystems. Land accumulation does not ensure the implementation of environmental use and land regulations. Some projects even cause disturbances in protected areas and established laws (for example, genetically modified soybeans in Botoșani County, although it is prohibited in Romania) (Boruss, 2015).

4. Analysis of the phenomenon from a political point of view

Large agricultural holdings tend to benefit from EU funds and funds granted by the national government. Facilities and subsidies are usually monopolized by large landowners due to their potential performance/efficiency and their ability and knowledge to access them (Boruss, 2015).

In Romania, public entities grant land concessions to large companies, thus facilitating the continuation of land grabs. Leasing contracts are prepared by the leasing company on their terms. Contracts are sometimes made in such a way that they are confusing and difficult for small farmers to understand, and sometimes they are not even respected (Eco Ruralis, 2013). From the studies conducted so far, there is no assistance or protection of any kind for those who are in a disadvantaged position. The advantages are taken by the investing companies. This paradigm leaves additional room for speculation and corruption.

Only certain actors and institutions gain from the lack of transparency of these transactions. All these problems added to the fact that small farmers will always suffer more from the risks of agricultural production than investors, whose existence does not depend on this directly on land, constrain local possibilities. Regulations and government are not on the side of farmers and agroecological food producers. In addition to the "legal" agreements that take place across the country, in expropriation processes, governments or companies usually do not compensate for the loss of public or communal property caused by land grabbing (Boruss, 2015).

III. CASE STUDIES

3.1. The case of Transavia – land grabber with Romanian capital

Transavia is a Romanian company with a tradition in the poultry market, with its operating model, which is based on a vertically integrated business system.

Transavia Group is the leader in the chicken meat market in Romania and is intensifying its exports both in the EU and in the Middle East. Currently, Transavia has more than 2,300 employees, more than 400 sheds in 29 poultry farms, and more than 10,000 ha cultivated with grain for the birds' consumption, a combined feed factory, 3 high-performance slaughterhouses of the latest generation, and a meat processing. Transavia farms are in eight counties in Romania: Alba, Cluj, Sibiu, Braşov, Timiş, Mureş, Harghita, and Caraş Severin, where over 100,000 tons of chicken meat are produced annually. Export represents 15% of the company's turnover and is carried out in several countries in the European Union, such as Great Britain, Ireland, France, Holland, Hungary, Greece, Slovakia, Bulgaria, Spain, Croatia, Czech Republic, Italy, and the African continent (Heubuch, 2016).

"100 euros or 800 kilos of wheat" as property tax payment, is what Transavia promised anyone willing to lease their land to the company. This payment is significantly lower than the amount paid annually in Romania as direct payments per one single hectare. However, unlike Transavia, it is practically impossible for small farmers with one or two hectares to become beneficiaries of such direct payments. Renting a few hectares is of financial or material interest; small farmers are happy with the idea of receiving €100 or 800 kg of grain per hectare every year to feed the few animals they have on the farm (Bouniol, 2013). A pitfall was that the contract of the lease had a term of 10 years, during which the lessor was obliged to pay a penalty of €690 per year per hectare for the residual term in case of premature termination by the lessor (Heubuch, 2016).

3.2. The case of Agro Chirnogi – land grabber with Lebanese capital

In the southeast part of Romania, Lebanese companies have been investing in agriculture-related businesses since the revolution. On 12 April 1991, the state company Agro-Chirnogi was established in Olteniţa. In 2002, the company was privatized, and in 2011, Agro-Chirnogi received the ISO 9001:2008 certificate for quality management systems and the ISO 22000:2005 certificate for food safety management systems (Heubuch, 2016).

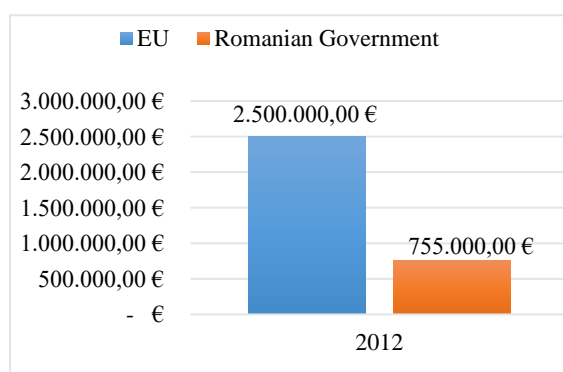


Fig. 5. Total subsidies that Agro Chirnogi benefited from in 2012.

Over 13,500 ha belong to Chirnogi, which is also the home of major companies growing cereals and oilseed plants. The Agro Chirnogi company (10,651 ha) owns state-of-the-art tools and equipment, buys agricultural products from Giurgiu and Călăraşi counties, and sells them on domestic and foreign markets (Corbu, 2012).

Through Maria Trading and Agro Chirnogi (both affiliated with the Maria Group), they have developed industrial agriculture and have plants for livestock. Covering more than 20,000 ha, the Maria Group's agricultural activities are facilitated by some strong political connections that provide a clear case for grabbing control over the land and decision-making processes regarding its use. Locally, residents are suspicious of the company, but they cannot oppose it because they have very few options to find jobs (Bouniol, 2013).

Călăraşi County and the small commune of Chirnogi offer what are perceived as ideal conditions for intensive agriculture. The largest agricultural corporations in the country are in this area - taking advantage of the extremely fertile land and the location near the Danube for river transport. Chirnogi is characterized by a large amount of good-quality soil and an aging population struggling to find employment. The availability of land resulting from the fact that the commune's population is aging allows Agro Chirnogi to fully spread its activities. Maria Trading and Agro Chirnogi, the two affiliated companies of Maria Group exploit more than 20,000 ha in the region. Established in 2002 in Călăraşi County, the two companies control 11,000 ha around Chirnogi commune, that is, approximately 70% of its land. The locals do not talk about what happened between the revolution and 2002 when the plots of the former state farm were given to the private company Agro Chirnogi. The company grows cereals (wheat, corn, canola, barley, sunflower, and alfalfa) using modern production systems. The products are mainly intended for export to countries such as Lebanon, Syria, and Egypt. This large-scale agriculture is once again associated with large-scale capital (Bouniol, 2013). In 2012, Agro Chirnogi applied for direct subsidies for approximately 11,400 ha, and the data shows that it would have benefited from €1.3 million (€107/ha) from the EU and €400,000 (€32/ha) from the Romanian government. In the same year, Maria Group also applied for direct subsidies for 10,000 hectares and would have benefited from €1.2 million from the EU and €355,000 from the Romanian government. From an environmental point of view, Agro Chirnogi's activities are harmful because they rely heavily on chemicals. The use of inorganic fertilizers, pesticides, and fungicides tends to reduce biodiversity and threaten ecosystems (Bouniol, 2013).

The company still plans to expand and increase its monopoly on arable land. Many owners sell or rent their plots to Agro Chirnogi in exchange for rent (between 650 and 850 kg of wheat or the equivalent of these kgs in lei). The contract period is between five

and ten years. If the owners want to terminate the contract, they must give a year's notice and pay the costs of land improvements (levelling, irrigation, etc.) undertaken by the company. Very few owners reclaim their land. Many smallholders or their heirs live elsewhere and are willing to give up their land, which the company buys. As a result, the agricultural cooperatives experienced a decrease in the number of members and the area of land in favor of the Agro Chirnogi company (Bouniol, 2013).

IV. LEGAL FRAMEWORK

Art. 1, ch. I from the Land Fund Law no. 18 of February 19, 1991, is the one that provides the clearest and strongest motivation for why the issue of land grabbing is included in the branch of land law: "Lands of any kind, regardless of destination, the title on the basis of which they are held or the public domain or of which they are a part, constitutes the land fund of Romania."

When we refer to land, we must realize that it is not a commercial commodity that can be manufactured in larger quantities. The land is a finite and limited resource, which is why it should not be subject to typical market norms. Land ownership, as well as their use and trading, must be subject to stricter regulations. The European Economic and Social Committee (EESC) believes that it is necessary to formulate, both at the level of the member states and at the level of the EU, a unique agro-structural model, from which to derive what involves land use and land rights (Nurm, 2015).

Land policy is within the competence of each member state. Member States may impose restrictions on transactions when national food and energy security is at risk or if there is an overriding public interest in imposing such conditions. Restrictions are allowed to avoid speculation, preserve local traditions, and ensure proper land use. At the same time, such restrictions limit the principle - enshrined in the treaties - of the free movement of goods and capital. Until March 4, 1998, when art. 68 of ch. V of the land fund law no. 18 of February 19, 1991, was repealed by al. (2) of art. 19 of law no. 54 of March 2, 1998 ("On the date of entry into force of this law, Chapter V - Legal circulation of land, art. 66-73 of the Land Fund Law no. 18/1991 is repealed") (Law no. 54 of March 2, 1998, regarding the legal circulation of land, published in the Official Gazette no. 102 of March 4, 1998), natural and legal persons who "do not have Romanian nationality and are domiciled in Romania, cannot acquire ownership of the land of any kind through deeds between lives" (Land fund law no. 18 of February 19, 1991, published in the Official Gazette no. 37/February 20, 1991), which meant that the land was available only to Romanian citizens.

On November 14, 2005, law no. 312 of November 10, 2005, regarding the acquisition of private ownership of land by foreign and stateless citizens, as

well as by foreign legal entities, in which it is written in chapter II, art. 3 that "The citizen of a member state, the stateless person domiciled in a member state or in Romania, as well as the legal entity established in accordance with the legislation of a member state can acquire the right of ownership over land under the same conditions as those provided by law for Romanian citizens and for Romanian legal entities". At the same time, art. 5, para. 1 of the same law says that "Citizens of a member state, stateless persons with domicile in a member state or in Romania, as well as legal entities established in accordance with the legislation of a member state can acquire the right of ownership over agricultural land, forests and forest land at the completion of a period of 7 years from the date of Romania's accession to the European Union" (Law no. 312 of November 10, 2005, on the acquisition of private property rights over land by foreign citizens and stateless persons, as well as by foreign legal entities, published in the Official Gazette No. 1.008 of November 14, 2005).

The Romanian Parliament adopted Law no. 175 of August 14, 2020 (Law no. 175 of August 14, 2020, published in Official Gazette no. 741 of August 14, 2020), published in Official Gazette no. 741 of August 14, 2020, for the amendment and completion of Law no. 17/2014 (Law no. 17 of March 7, 2014, published in the Official Gazette no. 178 of March 12, 2014) regarding some measures to regulate the sale-purchase of agricultural land located outside the city and amending Law no. 268/2001 (Law no. 268 of May 28, 2001, published in the Official Gazette no. 299 of June 7, 2001) regarding the privatization of commercial companies holding under management public and private agricultural lands of the state and the establishment of the State Domains Agency - through which amends some provisions relating to the sale of agricultural land.

One of the changes was made by establishing seven categories of pre-emptors, instead of the four categories established by the old form of law 17/2014 (co-owners, lessees, neighbours, and the State Domains Agency). The seven categories of pre-emptors that are in force are:

- a. "First-class pre-emptors: co-owners, first-degree relatives, spouses, relatives, and relatives up to and including the third degree;
- b. Rank II pre-emptors: owners of agricultural investments for tree crops, vines, hops, exclusively private irrigation and/or lessees. If there are agricultural investments for tree, vine, hop, and irrigation crops on the lands subject to sale, the owners of these investments have priority when buying these lands;
- c. Rank III pre-emptors: the owners and/or lessees of the agricultural land adjacent to the land subject to sale, in compliance with the provisions set out in para. (2) and (4);
- d. Rank IV pre-emptors: young farmers;
- e. Rank V pre-emptors: Academy of Agricultural and Forestry Sciences "Gheorghe Ionescu-Sișești" and

the research and development units in the fields of agriculture, forestry, and food industry, organized and regulated by Law no. 45/2009 regarding the organization and operation of the "Gheorghe Ionescu-Sișești" Academy of Agricultural and Forestry Sciences and the research-development system in the fields of agriculture, forestry, and the food industry, with the amendments and subsequent completions, as well as educational institutions with an agricultural profile, for the purpose of buying agricultural land located outside the village with the destination strictly necessary for agricultural research, located in the vicinity of the existing lots in their patrimony;

- f. Rank VI pre-emptors: natural persons with domicile/residence located in the administrative-territorial units where the land is located or in the neighbouring administrative-territorial units;
- g. Rank VII pre-emptors: the Romanian state, through the State Domains Agency."

Another amendment brought to law 17/2014 is constituted by the fact that the conditions that certain categories of pre-emptors must meet if they want to buy agricultural land have been changed. Thus, they have the obligation to fulfil the following conditions:

- a. "In the case of natural person lessees, to provide proof of domicile/residence located on the national territory for a period of 5 years prior to the registration of the offer for sale of agricultural land located outside the village;
- b. In the case of lessees, legal entities and associations, or natural persons, to provide proof of domicile/residence located on the national territory for a period of 5 years prior to the registration of the offer for sale of agricultural land located outside the village;
- c. In the case of legal entity lessees, with a shareholding of another legal entity, the shareholders who control the company to provide proof of the registered/secondary headquarters located on the national territory established for a period of 5 years prior to the registration of the offer for sale of the agricultural land located outside the city.

(3) In the case of the exercise of the right of pre-emption by young farmers, the priority for the purchase of the land subject to sale is given to the young farmer who carries out activities in animal husbandry, respecting the condition regarding the domicile/residence established/established on the national territory for a period of at least one year prior to the registration of the offer for sale of agricultural land located outside the village.

(4) For the purposes of this law, a young farmer is a person up to 40 years of age, as defined by art. 2 para. (1) lit. (n) from Regulation (EU) no. 1,305/2013 of the European Parliament and of the Council of December 17, 2013, regarding support for a rural development grant from the European Agricultural Fund for Rural Development and repealing Regulation

no. 1,698/2005 of the Council, as amended, who intend to carry out or carry out agricultural activities.

As a comparison, the old form of Law 17/2014 provided only three paragraphs:

1. "The alienation, by sale, of agricultural land located outside the village is done in compliance with the substantive and formal conditions provided for by Law no. 287/2009 regarding the Civil Code, republished, with subsequent amendments, and the right of pre-emption of co-owners, lessees, neighbouring owners, as well as of the Romanian state, through the State Domains Agency, in this order, at a price, and under equal conditions.

2. By way of exception to the provisions of para. (1), the alienation, by sale, of the agricultural lands located outside the village on which classified archaeological sites are located is made according to the provisions of Law no. 422/2001 on the protection of historical monuments, republished, with subsequent amendments.

3. The request and use of the land registry certificate in property transfer contracts regarding immovable property and other real rights fully prove the good faith of both the parties to the contract and for the instrumenting professional, regarding the quality of the owner of the seller on the property subject to sale according to the description in the land register."

Therefore, if the categories of pre-emptors do not show their desire or intention to acquire the agricultural land, only then can it be freely alienated to any other natural or legal person. Also, another new amendment previously presented is the establishment of the obligation to pay a tax of 80% of the amount representing the difference between the sale price and the purchase price of the agricultural land located outside the village, the difference being calculated based on the notaries' grid from that period. This provision is valid for the alienation by sale of an agricultural land before the completion of 8 years from acquisition. The regulations in force state that failure to comply with the provisions is punishable by the absolute nullity of the transaction. Another substantial amendment brought to law 17/2014 is given by the amendment of paragraphs (2) and (3) of article 6 of law 175/2020. These changes impose on the mayor's office the obligation to display the sale offer at its headquarters, or to post it on the website, within 5 working days from the registration of the sale offer, for 45 working days. Also, the town hall is also responsible for submitting a file containing the list of pre-emptors, copies of the request to display the sales offer and the supporting documents provided for in paragraph (1) - "the seller registers, at the town hall within the administrative-territorial unit where the land is located, a request requesting the display of the offer for sale of the agricultural land located outside the village, in order to bring it to the attention of the pre-emptors.

The request is accompanied by the offer to sell the agricultural land and the supporting documents provided by the methodological rules for the application of this law.", and the minutes of the display

of the offer, also within 5 working days to the structure within the central apparatus of the Ministry Agriculture and Rural Development, hereinafter referred to as the central structure, respectively the directions for agriculture of the county or the municipality of Bucharest, hereinafter referred to as territorial structures, as the case may be, as well as the State Domains Agency.

For example, the change in the establishment of the categories of pre-emptors makes it difficult for speculators and land grabbers to access agricultural land by exercising the right of pre-emption, precisely because they do not fall into any of the 7 categories of pre-emptors, and pre-emptors have priority when buying agricultural land located in the outskirts that are intended to be sold. Only if none of the pre-emptors express their desire to acquire the land, it can be freely alienated to other persons.

The change in the obligation to pay the tax of 80% of the price difference between the sale price and the purchase price for people who want to sell the agricultural land before the expiry of the 8-year period from its acquisition does not clearly present the way of calculating this tax, fact which results in making it difficult to apply this procedure. Also, from February 8, 2021, the applicable rules of Law 175/2020 are in force, but some of the essential terms of the law text do not have a clear definition, so the role of establishing this tax is to put a ban (indirect and temporary) of the sale of agricultural land.

V. RECOMMENDATIONS

1. Developing a structure with the role of a European land observatory to monitor large-scale land offers and land investments - Now, accurate and useful data on the functioning of EU land markets and the extent of agricultural land grabbing are still lacking. Thus, while there are some statistical tools that collect information on land ownership at the EU level, they are all highly technical and, while capable of generating a degree of legal certainty, say nothing about the substantive nature of a land transfer nor if such a transfer is justified in terms of social and environmental equity. This is also true for associated processes, such as the degree of financial involvement in land and the agricultural sector, where latent threats remain unchecked. The creation of a European land observatory documenting changes in land ownership including economic, social, and environmental criteria could be an important step towards the development of a real, socially relevant database on the state of the land in Europe today (Kay, 2016).

2. Allowing Member States to better regulate their land markets in line with sound public policy objectives, placing justified restrictions on the principle of free movement of capital - Inevitably, markets naturally tend towards concentration. A land market based only on the four freedoms (of goods, persons, services, and capital) is not comprehensive

enough to address the risk of discrimination and marginalization related to agricultural land grabbing. In addition, land is not an ordinary commodity that can be manufactured in ever-increasing quantities but serves as the basis of people's livelihoods, territories, cultures, traditions, and interactions with nature and the environment. Therefore, the Court of Justice of the European Union must demonstrate greater flexibility in the interpretation of national measures that can be taken to restrict the free movement of capital in accordance with justified political objectives, in accordance with art. 65 of the Treaty on the Functioning of the European Union. Art. 65 of the Treaty on the Functioning of the EU mentions the fact that art. 63 ("Pursuant to the provisions of this chapter, any restrictions on the movement of capital between member states, as well as between member states and third countries are prohibited") does not affect the right of member states:

- a. "To apply the incidental provisions of the tax laws that establish a distinction between taxpayers who are not in the same situation as regards their residence or the place where their capital has been invested;
- b. To adopt all the necessary measures to combat the violation of their legislative acts and their administrative rules, in the fiscal field or the prudential supervision of financial institutions, to establish procedures for declaring capital movements for the purpose of information administrative or statistical or to adopt measures justified by reasons of public order or public safety" (Kay, 2016). Thus, there are several policy options that Member States can consider in this regard: setting upper limits for the purchase of agricultural land and creating a system of pre-emptive rights to help those whose land ownership is under this upper limit.

3. Pushing EU institutions to act on European land issues - The debate within the EU institutions on land grabbing and land concentration in Europe has been somewhat sporadic, being split between various European parliamentary committees (including the European Economic and Social Committee and the Subcommittee on Humanlaggedof which have published reports on these subjects) and the European Commission which lagged behind, having not carried out any special research into the issue of land grabbing.

4. Promoting the land sovereignty movement - Land sovereignty is the right of working people to have effective access to use and control over land and the benefits of its use and occupation; where land is understood as a resource, territory, and landscape. Simply put, land sovereignty is the realization of the human right to the land of working people. It allies itself with and is intrinsically linked to the growing global movement for "food sovereignty". Thus, for example, the Romanian rural space must be reconsidered to attract the active population. Local authorities, government, and European authorities must stop land grabbing and must encourage

diversified farming of small-scale family farms, and the only viable option for rural development is based on environmentally responsible principles (Boruss et al., 2015). Food production must take priority over biofuel production in the use of agricultural land. Also, local communities should be involved in land use decisions; if they benefit from more rights and possibilities in this regard (Nurm, 2015). However, land grabbing is an expression of the dominant development model based on a sustained, increased, and unequal consumption of both finite natural resources and "renewable" resources. Land grabbing is the chronic manifestation of an industrial model of agri-food products, production, and energy consumption controlled by transnational corporations within a world system of trade and investment dominated by finance capital. A strong sovereignty movement across borders is a good way to deal with land grabbing (Boruss et al., 2015).

VI. CONCLUSIONS AND FINAL REMARKS

The whole purpose of the article is to highlight the fact that land grabbing is a negative phenomenon and to find possible solutions to reduce and even stop its effects. Unfortunately, this phenomenon has spread to Europe so much that small farmers have nothing left to do but to alienate their land to the owners of large private companies in other states, not to other states themselves. Due to the low land prices, the good quality of the soil, the permissive legislation, but also the existing corruption in the Eastern European states, the basis of European agriculture is affected and implicitly every European citizen. Food is not a choice, it is a necessity, and agricultural land is not just a convenience, but much more than that. The last intervention by the European institutions was when the Economic and Social Committee expressed its opinion on land grabbing in 2015. However, since then, there have been no steps in this direction, from which we can conclude that the problem of land grabbing is not considered to be of major interest to European institutions.

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Analysis of Good Forest Improvement Practices Applicable in Romania

Lavinia-Felicia FUGA¹, Alin GAUREANU², Iulia-Maria OANCEA³

Abstract – The paper aims to emphasize how Romania can improve its measures for protecting the national forest fund through environmental policies and strategies. The method used is the comparative one of data and reports from Romania, the European Union, Sweden and Austria. It follows from the analysis of statistical data, strategies, and European forest-related regulations that their implementation at the national level largely determines the effectiveness of European environmental policies. One of the solutions resulting from the analysis is to implement the European strategies coherently and fully, corroborated with the efficiency of the legal regime and the sanctions in the forestry field.

Keywords: Environmental law, environmental protection, sustainability, protected natural areas, forest fund, forestry regime, European Union.

I. INTRODUCTION

This paper analyses the situation of the forest fund in Romania with the generic one of the EU, particularly in Austria and Sweden.

For Romania, an analysis of how the state authorities protect the forest fund is relevant, given the importance of the consequences for the health of society and economic productivity, both in the short, medium, and long term.

II. ENVIRONMENTAL LEGISLATION AND THE LEGAL REGIME OF THE FOREST FUND

2.1. Environmental law in the Romanian legal system

In the Romanian legal system, environmental law is a distinct branch within the legal system. This appeared due to the continuous development of a category of "social relations regarding the protection, conservation and improvement of the environment, with specific features, which do not constitute an object of regulation for any of the traditional branches of law"

[1]. The environmental regulations have as their objective the establishment of positive measures, of sustainable development, with an impact in combating pollution, ecological management, and the sustainable exploitation of resources, which implicitly influence the social and economic space in the medium and long term. Regulations in the environmental area require a multidisciplinary approach, in "close interdependence with the natural sciences, technology and social sciences, involving both internal regulation and Community European or international, expressing a general interest of humanity"[1].

Both by general law and by special laws, the fundamental task of environmental legislation is to regulate the protection of the environment and various environmental factors. The following principles are considered in the law-making: prevention, precautionary, 'polluter pays' [1].

By drafting the Forestry Code and establishing the forestry regime, the legislator has the protection of forests as its objective. In this context, most norms are attributed to an imperative characteristic (onerous, prohibitive and coercive) through economic, technical, forestry and strictly legal measures that comprise the forestry regime.[1]

The set of special legal rules on the protection of forests is a distinct side of their legal protection. Thus, the legal norms relating to guarding and protecting public state forests are highlighted and ensured, according to art. 11 para. (1) of Law no. 46/2008 (Forestry Code), by the "National Forest Administration - Romsilva, an autonomous administration of national interest, under the authority of the State, through the central public authority responsible for forestry" for the publicly owned forest fund of the State under its administration "against illegal logging, thefts, destructions, degradations, grazing, poaching and other harmful deeds for the forest fund, according to the law" (Forestry Code art.51).

¹ Polytechnic University of TimisoaraRomania, lavinia.fuga@student.upt.ro

² Politehnica University of Timisoara, Romania, alin.gaureanu@upt.ro

³ Politehnica University of Timisoara, Romania, iulia.oancea@student.upt.ro

2.2. Environmental protection issues

Environmental protection is a global problem with a multitude of protection laws, adopted as transnational and national regulations and guidelines, aimed at the sustainable use of water, soil, air and biomass [2].

Therefore, the issue of environmental protection can be seen in two aspects. The first aspect relates to the fact that the protection of the environment has as its unanimous task the discovery of the causes and sources of pollution, the establishment of ways of preventing, reducing, and removing the effects of pollution, and the second aspect is determined by the fact that it has as its task the protection of the various components of the natural and artificial environment.

In the same context, as anthropogenic pressures on the environment have increased over the last century, the need for systematic protection of the environment has increased. It has led to considerable experimentation regarding the measures used by mankind to achieve its protection objectives. Even though some of them have been successful, *the big picture is one of failure*. That is why a complex of human, rational and scientific activities based on protecting natural and artificial environmental factors is needed [2].

Although it has been established by law that the protection and development of the environment is a matter of national interest, the complex and difficult task of protecting the environment cannot be fully fulfilled by the state bodies, being necessary from this point of view the contribution of non-state organizations, individuals, and legal entities.

2.3. Issues related to the need for forest protection

Forests serve interdependent and multiple ecological, economic, and social functions, often simultaneously on the same territory. Protecting this multifunctionality requires a balanced approach to management based on adequate information from the forestry sector [3].

In the context of forest security and protection, it has been found that it would be indispensable to train specialised officers of the judicial police, since the bodies currently in charge of forest security and protection do not have clearly defined competences, about police units and gendarmerie, but also to other natural and legal persons [4].

Even if the actions of the forest fund and its management are provided for in the Forestry Code and in the provisions of the Criminal Code, the question arises of drawing up an Environment Code, which specifically regulates, in a unitary and appropriate conception, criminal liability for environmental damage, which could be much more effective in regulating and combating the damage generally caused to the environment, and especially the forests [4].

III. SUSTAINABLE DEVELOPMENT MANAGEMENT AND FOREST ISSUES

It is worth noting that environmental sustainability is one of the biggest challenges and most important targets of the current times [5]. It is the area of major attention for researchers, governments and non-governmental organizations involving individuals, communities, countries, continents, and the whole world. The fundamental concern of modern society is that while today's people enjoy economic comfort, future generations are on the verge of facing rare natural resources and a polluted environment. Our most important responsibility is to leave the planet as a sustainable auto system that offers equal chances of survival to our future generations and to all other species living with us. [6].

Despite all the efforts made so far, current policies cannot achieve the objectives of conservation and sustainable use of forests. Therefore, the intensification of measures to protect existing forests, the active and sustainable creation of new forested areas, and the sustainable management of forests must play a key role in Romania's sustainable development policies [7].

Thus, we can say that sustainable forest management would require two major actions. On the one hand, the protection of the current forests, and on the other hand, the development of the forest heritage [8].

Recently, there has been an increase in awareness of the importance of forests in various policy debates and in the context of the COP21 agreement in Paris -at the Convention on Climate Change in 2015 [9], where the topic of forests has been an integral part of the discussions on climate change. Regarding climate change mitigation and carbon sequestration, forests are perhaps the only natural tool we can manage. It is in our power to cut and grow forests, while on the oceans, for example, we do not have such control [8].

It calls for restoring, protecting, and promoting the sustainable use of terrestrial ecosystems, which support 'life on land', in the SDG 15 - Sustainable Development Goal plan. [10]. A key component of the FAO's monitoring of key indicators of SDG 15 by the FAO (Food and Agriculture Organization) is the overall assessment of forest resources, as reference data is reported and collected on trends in changes in the forest area and progress on sustainable forest management [11].

Although at present, more than half of the total, namely 2.05 billion hectares of forests, are the subject of management plans, and awareness of the importance of forests has increased in recent years, it is necessary that there be a partnership of to all nations of the world, the only one capable of ensuring an efficient and balanced global economy [11].

At the same time, the fact that Romania is committed to meeting the national and global objectives, regarding the protection of the forest fund and the sustainable management of forests, proves that it wants to improve the way it manages and protects the

national forest fund [12]. In 2017, the inclusion in 2017 of over 24,000 hectares of valuable beech forests in the UNESCO World Heritage List is an essential measure to strengthen the protection status of these forests, but also for the potential impulse that this measure will be able to generate, to ensure the protection of all virgin and quasi-virgin forests in Romania. The envelope of the measures regarding the sustainable management of the national forest fund, established in the National Forest Strategy 2018-2027 [13], will have as impact the increase of the area occupied by forests and forest vegetation of Romania [14].

3.1. General aspects of the Romanian forest fund

The main task of the Ministry of Environment, Water and Forests is to ensure that all logging in Romania is sustainable and that it is carried out without the destruction of the last old-growth forests on the continent and wildlife [15].

The state forest fund had a total area of 6,341,260 hectares in 1990. According to the National Forest Administration – Romsilva, the state's public forest fund has decreased considerably compared to the situation in 1990, because of the application of the laws on the reconstruction of the property right. Thus, as can be seen in Fig. 1, the national forest fund decreased from 6,341,260 hectares (1990) by 3,205,000 hectares to 3,136,000 hectares (2018), with a significant loss of 2,510,000 forest hectares between 2000 and 2010 [16].

As far as can be seen in Table 1, at the end of 2020, the public property represented a total of 64.3% of the area of the national forest fund being owned by the state (48.2%) and by the public administrations (16.1%), generally managed by the National Forest Administration – Romsilva. The total private property, 35.7%, owned by individuals or companies (34.2%), together with the one in the possession of territorial administrative units (1.5%) is mostly managed by private forestry structures.

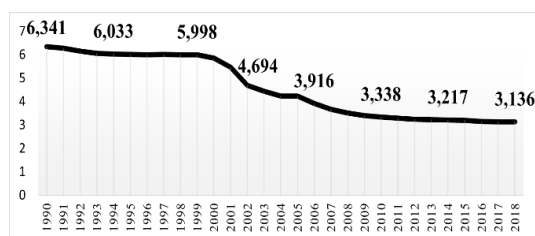


Fig. 1 – State of the state of the state-owned forest fund, 1990-2018
(Own graphics based on RNP – Romsilva

http://www.rosilva.ro/articole/prezentare_generala_p_178.htm)

Table 1 – Forest structure, by forms of property, at the end of 2020

Owner - Romania		%	
Privat	Individual and companies	34,2	35,7
	Teritorial administrative units	1,5	
Public	State	48,2	64,3
	Teritorial administrative units	16,1	

Source:

https://insse.ro/cms/sites/default/files/field/publicatii/statistica_activitatilor_din_silvicultura_in_anul_2021.pdf

If only a little over half of Romania's forests are owned by the state, the Ministry of Environment, Water and Forests, it is to supervise the entire forestry fund, whether it is public or private [15].

The composition of the forest is varied; conifers represent 31% of the total forested area (23% spruce, 5% fir and other conifers 3%), beech 31%, oaks 18%, other hard deciduous 15% and soft deciduous 5%. In terms of tree cover, the area is larger (about 8 million hectares), the difference being given mainly by the reforestation of abandoned agricultural land [17].

According to the distribution of the forest fund area by counties, as of the end of 2018, the largest areas of forest fund were recorded in the north-east and south-west of the country: Suceava (438 thousand ha), Caras-Severin (428 thousand ha), Hunedoara (318 thousand ha). On the other hand, due to the desertification phenomenon of the land in these areas, the smallest areas of forest background were recorded in the counties in the south-south-east of the country: Calarasi (22,000 hectares), Ilfov (26,000), Ialomita (26,200), Braila (28,000) and Teleorman (29,000 hectares) [18].

3.2. The regime of protected natural areas in Romania (Natura 2000 Network)

The creation of protected natural areas is the most widespread and effective method of preserving highly natural forests and is the basis for nature conservation legislation in Europe. Around 12.2% of Europe's forests belong to protected areas (around 29.9 million hectares), but only 1.5% (around 3.1 million hectares) are under strict protection ('no active interventions'), according to the State of Europe's Forests Report 2015 [20]. About two live from the strictly protected forests are in the Scandinavian countries of Finland and Sweden [21].

According to the report published in 2016 by WWF (World Wide Fund for Nature) "The state of implementation of the Natura 2000 Directives in Romania", the main problems found in this regard in Romania are the financial constraints in the management of protected natural areas, especially in terms of insufficient budgetary allocations for nature conservation, with the related limitations on the management structures and implementation of the necessary conservation measures, together with incomplete scientific data (especially on the species/habitats that are present in the Natura 2000 sites) and the inefficient communication and cooperation with the public and between stakeholders/institutions [22].

Although Romania has designated 583 Natura 2000 protected areas, covering almost 25% of its national territory, gaps have been identified in efficiently managing these valuable areas. The management of protected areas is affected by many factors, such as the lack of firmness and poor coordination of the Natura 2000 network at the central level, the low level of information at the local level on the rights and obligations of landowners/concessionaires located on

the protected areas area, underfunding and lack of compensation payments for landowners/managers. [23]

3.3. Threats to the forest fund

Based on the specific information, it can be said that there are the following threats to the forest fund: illegal logging - which is taking place at an unprecedented rate; the phenomenon of desertification, deforestation and forest degradation, which is not even slowed down; the natural environment degrades due to irresponsible forestry practices and the indifference of the authorities responsible for their protection. [24]. These results make the authorities accomplice in destroying Europe's most complex natural heritage. At the same time, the felling of trees due to urbanization, industrialization, mining, and the use of wood for domestic and other purposes has led to the massive depletion of forests. [25]

At the same time, many factors can lead to the degradation and deforestation of forests, which are the basis for the decline of the forest fund, as well as of the biodiversity in Romania, such as the lack of viable policies, poor governance, lack of law enforcement, illegal activities and lack of investment in sustainable forest management as well as urbanisation, infrastructure development and exploitation of natural resources, over-exploitation of ecosystems and species, loss of wetlands along the Danube, pollution, uncontrolled tourism, and last but not least trade in rare and threatened species. [1]

Consequently, the analysis of the information presented in this chapter reveals the following main problems of the forestry sector in Romania: the lack of an effective correlation of the legal provisions in the field of forestry with regulations in other fields and other ministries, such as the fiscal code, the criminal code, the civil code and the arms and ammunition regime, environmental protection, etc.; the legal framework, which is elaborated with emphasis on sanctioning the facts produced and not on the prevention of their occurrence; the existence of a significant area of forest for which forest management or services are not provided and for which no forest management plans are developed; lack of computerised records of forest land and of demarcations between owners; not updating the indicators for sustainable forest management in the European and national context; the underfunding of the sector, as well as the failure of the state to comply with its legal obligations under the legal provisions, as well as the lack of forestry education platforms and programs addressed to civil society and especially to children.

3. 4. Forest protection measures in Romania

Past forest management methods can influence current management and conservation measures. However, understanding the past management of forest ecosystems as well as how property evolves makes the

current forest technics based on sustainability and sustainability [26]

As regards the methods of forest management applied in the past, we have identified that Romania has lacked a forestry strategy in the field for recent years, as well as an impact analysis of the Forest Strategy of 2001-2010, which can thus affect the current forest management and conservation measures and may lead to the impossibility of setting well-defined priorities or an effective action plan based on previous experiences. However, it has undertaken several public policies relating to the conservation and development of forest resources (the 2005 National Forest Programme) and the fight against illegal logging by applying measures such as the introduction of illegal logging as a threat in the national security law (National Plan for Combating Illegal Logging)).[27]

Forest protection measures include those measures of coercion and accountability of the perpetrators who attack the forest fund. Although these measures materialized and explicitly quantified at some point in various sanctions, they also represent a permanent challenge of regulating and adapting them to the evolution of society, the degree of perception of the distinction between good and evil and the level of social danger represented by facts in this forestry field.

At this moment in Romania, we have a basic regulation in this field, namely the Forestry Code (Law 46/2008), where the entire range of legal responsibilities is recorded, starting from the disciplinary, material, civil, contravention and criminal ones. It is worth noting that the sanctioning level (criminal and contravention) increases directly to the calculated damage. The calculations consider the value of the damage caused to the forest, to which is added to the value of the unrealized forest's functions. Special normative acts regulate these calculations.

The calculation of damages contributes to the recovery of the costs of restoring the affected forest fund to its original state and the individualization of criminal penalties. With all these calculations and sanctions meant to discourage the offenders, it is observed that the maximum limits for sanctioning forest crimes are between 2 and 7 years in prison, the usual limits being between 6 months and 1 year or a criminal fine. These limits can be added up to half of those limits for various aggravating described by law. Basically, the most serious criminal sanction can be up to 10.5 years in prison in case of exceeding 20 times the value of one cubic meter of unexploited wood.

There are also special regulations of forest contraventions through Law 171/2010, where specific sanctions are established (the same depending on the damage), which can be fines of up to 50,000 lei (about 10,000 euros), but also complementary contravention sanctions for confiscation of assets destined, used or resulted from committing the acts. These contravention sanctions are applied for the violation of the legal obligations regarding the forestry field and refer to: administration, arrangement, integrity, regeneration, exploitation or movement in this field.

The regime of these offences is influenced by the general regime of contraventions, which provides that it is possible to pay 1/2 of the amount of the fine if it occurs within 15 days of its delivery.

The disciplinary sanctions of the forestry staff are regulated by GEO (Government Emergency Order) 59/2000. In this normative act, in addition to establishing these disciplinary sanctions, we also find motivational elements and the protection of the forestry worker. At the same time, a special status of it is created, like that of policemen or gendarmes, invested with the exercise of public authority, corroborated with the provisions of art.257 para.(4) of the Criminal Code establishes the increase by half the limits of the penalties for the crimes committed against such persons. In addition, forestry personnel have a special status in exercising their duties in forests, hunting, fisheries and protected areas. They are equipped with lethal or non-lethal armaments, as the case may be, in accordance with the legal regulations on the arms and a munition regime.

Other generic obligations regarding the forest fund are regulated under GEO 195/2005 on environmental protection.

IV. FOREST BACKGROUND SITUATION IN COUNTRIES OF THE EUROPEAN UNION

4. 1. European Forest Fund

As shown in Fig. 3, the European forest fund is constantly growing. The forest fund grew between 1990 and 2020 by about 0.29 million square km, that is, by 29 million ha. It represents an increase of about 23% from about 130 million hectares to about 160 million hectares of forest. Thus, forested land in Europe accounts for about 5% of the world's forest area. In parallel, the 4% increase in forest coverage of the total area of the European Union is also observed, from 35.93% to 39.84%. In comparison, there is a reverse phenomenon worldwide, of a 1% decrease in the share of forest cover, from 31.6% in 1990 to 30.7% in 2016, according to World Bank statistics.

Unlike many regions of the world where deforestation remains a major problem, it is worth noting that the European Union's forest area is increasing, thanks to afforestation policies and the conversion of abandoned agricultural land into forests or by self-regeneration [28].

The largest forested areas of the Member States are Sweden and Finland with forest cover of more than 60% of their national territory (Fig.4)." Romania has about 29.3% of the territory covered with forests. To reach or even to exceed the European average of 40% it will have to comply with the strategies in the field (European Forest Strategy 2030), newly adopted and consider the examples of the states that manage their forests and protect them more efficiently. For the analysis of good practices, we consider Sweden and Austria.

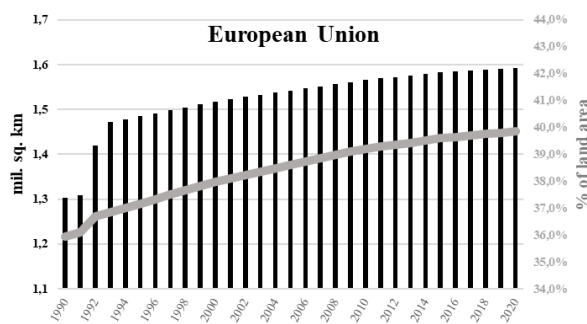


Fig. 2 - The evolution of the European forest fund between 1990 and 2020 (Own graphics, based on <https://data.worldbank.org/indicator/AG.LND.FRST.ZS>)

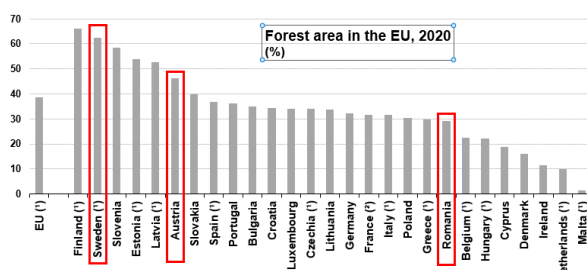


Fig.4 - Percentage of forest area in national areas in the EU (Eurostat source - https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Forests,_forestry_and_logging#Forests_in_the_EU)

4.2. EU involvement in forest protection

Although there are currently many European Union decisions and regulations in the field of the environment, the effectiveness of European environmental policies is largely determined by their implementation at the national level. Thus, forestry policy remains primarily a national competence [7], the European Union only adopts European forest strategies and supports a series of measures that have a significant impact on European countries. The European Union also has the competence to act in all areas of environmental policy. It seeks to identify the best way to manage forests in Europe, ensure that they are managed sustainably, and strengthen the Union's contribution to promoting sustainable forest management and combating global deforestation. At the same time, within the European Union's environmental policy framework, the nature protection network "Natura 2000" was created in Directive 1992/43/EEC and Directive 2009/147/EC [29].

In its regular package of infringement decisions, the European Commission continues legal action against Member States for failing to comply with their obligations under Eu law, such as Romania (stopping illegal logging), Germany (improving the rules for the protection of surface waters against pollution), Greece and Malta (need to adopt national air pollution control programmes) [31]. These decisions, which cover different sectors and policy areas of the European Union, aim to ensure the correct application of European Union law to benefit citizens and businesses. The Commission identifies possible breaches of EU law under its own investigations or following

complaints from citizens, businesses and other stakeholders [32]

As I mentioned, Romania was urged by the European Commission in 2020 to stop illegal logging by properly implementing the EU Timber Regulation [33]. It also called on Romania to take the necessary measures to better protect and manage its Natura 2000 network, thus complying with its obligations under the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992), [31].

4.3. Situation and forest protection measures in Austria

Austrian forest land, according to Fig.4, increased to approximately 4,000,000 hectares, representing 47.6% per cent of the country's land area or half a hectare per capita [34].

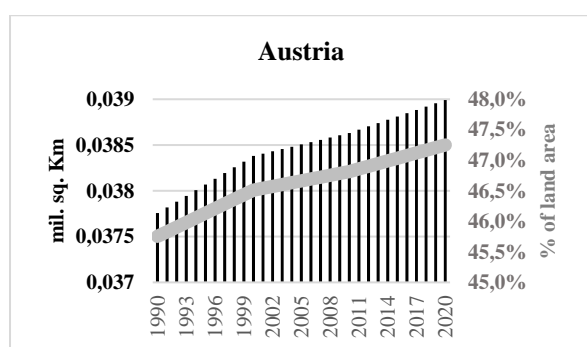


Fig. 5 - Forest area in Austria between 1990 – 2020 (Own graph based on <https://data.worldbank.org/indicator/AG.LND.FRST.ZS>)

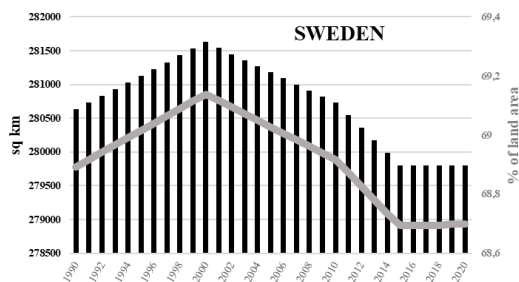


Fig. 3 - Forest area in Sweden between 1990-2018 (% of area
Source: Own graphics, based on FAO,
<https://data.worldbank.org/indicator/AG.LND.FRST.ZS>

Austria's forest fund has steadily increased since 1990 from 3.78 million hectares to about 4 million hectares today, also increasing the percentage of forest occupancy in the country's surface, from 45.8% to 47.6%. In addition, 30% of Austria's forests (1.2 million ha) are declared protected forests.

According to agricultural and forestry statistics, Austria has about 214,000 forestry holdings, of which 140,000 are less than 5 hectares; 57,000 forest holdings are between 5 and 20 ha; 12,000 enterprises are in the category from 20 to 50 ha; 4,000 forest holdings range from 50 to 200 ha; and about 1,000 enterprises are larger than 200 ha. The total area of the Austrian forest is classified into six distinct categories, in terms of forest ownership (Table.1), [35].

Table 2 - Forest ownership structure in Austria

Owner - Austria		%	
Privat	Private forests under 200 ha	48,20	80,38
	Private forests over 200 ha	21,26	
	Common rural property	10,92	
Public	Communal property	2,07	19,62
	Provincial governments property	1,87	
	Austrian Federal Forests SC and other public forests	15,68	

- Source:

https://facesmap.boku.ac.at/library/FP1201_Country%20Report_AUSTRIA.pdf

Table 3 The structure of swedish forest owners – Source: <https://www.skogsstyrelsen.se/en/statistics/subject-areas/ownership-structure/>

Owner - Sweden		%	
Privat	Individual owners	48	78
	Private-owned limited liability company	24	
	Other private owners	6	
Public	State	8	22
	State owned companies	12	
	Other public owners shareholders	2	

Forest cover in Austria has been steadily increasing for several decades by about 5,100 ha/year. This is mainly due to the fact that former agricultural land, such as mountain pastures, pastures or meadows, have once again become forests. Even landfills become reforested [36].

In Austria, satisfactory forest management can only be carried out with well-trained foresters, and that is why forest education and forestry research have such a long tradition in Austria. There are different levels of forest education: the training of forest guards takes a year at a forestry school. The tasks of forest guards mainly include guarding and supervising forests. Foresters are trained at two technical forestry high schools for five years and require a final examination under federal supervision after a two-year practice. They are employed in enterprises between 500 and 1,800 ha at supervisory level; enterprises of over 1,800 ha are required to hire graduates from the university of agriculture. After a three-year practice, he must pass an exam under federal supervision [34].

4.4. Forest protection measures in Sweden

Sweden is often seen as a leader in terms of forest sustainability. It is sparsely populated and 70% of its land area is covered by forests [37]. The Swedish Forest land is around 28 million hectares [38].

Between 2000 and 2014 there is a decrease of about 0.44% from the maximum in 2000. Since that decrease in 2014, Sweden has seen the percentage of forested area in the national area remain constant at the same level. Due to the increase until 2000 of 0.22% and the decrease of 0.44%, it results in a cumulative decrease of 0.2% between 1990 and 2020. However, the level of the forest fund remains at the same percentage, with little progress, reaching now up to almost 70%.

Sweden is also characterized by a relatively high percentage of private forests according to Table.2. About 78% of the country's forest land is owned by private forest owners and the remaining 22% by the state.

"Swedish system involves binding laws, non-binding 'advice', and certification schemes, which sometimes are difficult to coordinate for the purpose of facilitating implementation. " [39].

The Swedish Forest model is built on renewable forests, so that when the exploitation of old forests is finished, a new forest is created. When the forest is young and middle-aged, it grows the fastest, thereby absorbing more carbon dioxide from the atmosphere. By monitoring and using modern technology, forest experts identify the trees that should be harvested and the trees that should be left behind [40].

"The Swedish Forest Agency is, at present, revising its monitoring system and has suggested increasing supervision of planned forestry activities" [39].

V COMPARATIVE ANALYSIS OF EU COUNTRY DATA PRESENTED AS EXAMPLES (ROMANIA, SWEDEN, AUSTRIA)

The analysis based on square kilometres or hectares of forest is not relevant from the perspective of the reference to the value of the total forested area in the EU, areas that were modified during the analysis period (1990-2020) by the accession of several states to the EU.

We believe that the evolution of the percentage of forested areas in the areas of the exemplified countries is much more relevant, the EU reference remaining in this case a constant.

It is observed in Fig.7 the percentages of forest areas of the countries analyzed and their evolution between 1990-2020. If at EU level there is a positive evolution of 3.9%, respectively 2.3% for Romania, respectively 1.5% for Austria, Sweden registers for the same period a negative evolution of 0.2%.

In practical terms, it highlights a trend of a steady increase in the percentage of national areas, implicitly reflected in the cumulative average percentage at EU level. The only remarkable anomaly from this upward trend is observed in Sweden. This decrease, did not affect the leading concentration of the forester surface within the EU, Sweden maintaining the second place, after that of Finland in this ranking, as we have already seen in Fig. 4.

Analyzing the information presented in this chapter, we have discovered some measures implemented by Romania that are identical to those adopted by Austria and Sweden, such as: setting up sites/applications for storing wood (SUMAL Application 2.0), strengthening, maintaining and promoting biodiversity in forests (sites "Natura 2000"), granting subsidies to forest owners (it is granted in Romania if forest owners have more than 100 hectares and do not exploit the forest).

Table 4 Comparison between forest ownership structures

Owner	Romania	Austria	Sweden
Privat	35,7%	78,0%	80,4%
Public	64,3%	22,0%	19,6%

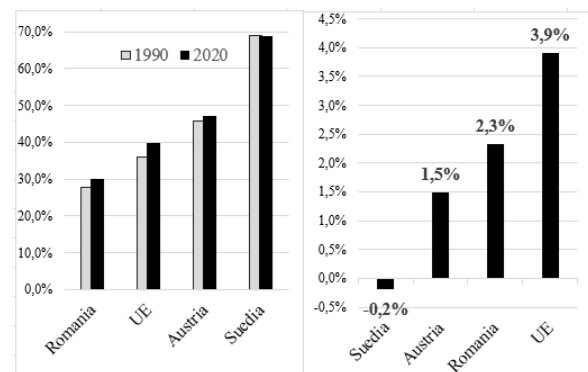


Fig.7 – Differences in the evolution of forest areas

The table shows that the form for Austria and Sweden, the form of private property of forests is 3-4 times larger than the public one, and in Romania the private property is about 1.5 times smaller than the public property. From another perspective, it can be said that the percentage of private property of forests in Romania is twice as low as in Austria and Sweden, and the percentage of public property in Romania is about three times higher than in Austria and Sweden.

V. CONCLUSIONS

At first glance, it could be concluded that there is a cause of effect link between the form of ownership and the evolution of the percentages of forest areas. It could be said that the majority public property administered by the state of Romania directly determines a more pronounced increase in the forested area. But, if we observe that the increase of the forest area in Romania is directly proportional to the decrease in the share of public property, we conclude that private property stimulates the growth of the forest area, which is also confirmed by the average increase at EU level.

Strictly regarding the situation in Romania, we note that perhaps an increase would not have been possible due only to the gradual transfer of the form of ownership, if this transfer had not been strategically accompanied by government measures regarding the protection, conservation and development of the forest fund, complemented by more drastic sanctioning measures, which have evolved and adapted over time. Moreover, these good practices already carried out by Romania can be completed by the measures taken by Austria and Sweden, which aim to:

- Establish a distinction between protected forests, which need protection (due to the dangers to which they are exposed) and protective forests, which protect people and their settlements (from floods, landslides, rockfalls, etc.);

- The formation of well-trained foresters (preparation the professional training of forest workers and the training of forest guards), because only through them can satisfactorily forest management be achieved (that is why forest education and forest research have such a long tradition in Austria);
- Afforestation of former agricultural land or former landfills;
- Reforestation by repopulation with plants of origin, wherever natural regeneration cannot produce seedlings;
- Obliging forest owners to replace all directly felled trees by planting new trees, sowing or natural regeneration at the latest by the third year after harvesting;
- Obliging forest owners to ensure that rare plants and animals, rare biotopes, large trees, old/dead trees, and protection zones adjacent to lakes and watercourses are protected as much as possible.

Of course, these proposed measures are only a component for combating the phenomenon of the degradation and deforestation of the national forest fund, although the legislation largely fulfils its role, there is also a need for political will and power in the implementation of European strategies, money allocated by the EU. Such a pillar of forest area growth is at the beginning of the road. It is about creating forest curtains for the protection of agricultural fields against desertification. Recently, through the National Recovery and Resilience Plan (NRRP - PNRR). It offers the possibility of full funding from EU funds with 500 million euros for the establishment of 56,700 hectares of forest, according to the Afforestation Financing Guide (<https://www.primaimpadurire.ro/ghid-impaduriri-pnrr/>).

As seen from Fig.8, the potential for applying this strategic measure is real in the southern and eastern part of Romania's territory, on the less colored areas. More intense color means a greater concentration of forests. From an example of the situation of the forests in Sweden and Austria, they develop more strongly in mountainous areas or cool areas in the north of the continent (the case of Finland). Romania has in the mountainous and sub-mountainous area only three counties (Suceava, Hunedoara and Caras-Severin) that have a maximum density of forests, having many other mountainous and sub-mountain areas where forest development is conducive. In addition, by this usual development, Romania can forest more intensely (more intensely colored) about 25%-30% of the territory in the south and east of the country that is mainly a plain area, with forest curtains for crop protection.

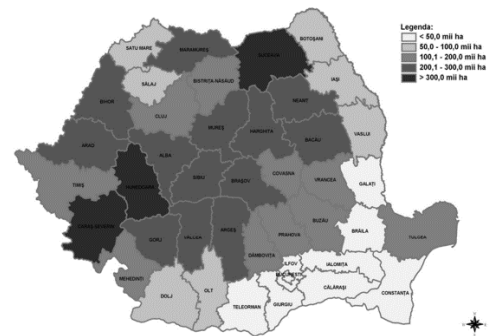


Fig. 8 Forest fund by county at the end of 2021 (National Institute of Statistics -

https://insse.ro/cms/sites/default/files/field/publicatii/statistica_activitatilor_din_silvicultura_in_anul_2021.pdf)

Crop protection is manifested not only by blocking winds, blocking the emergence of sand (desertification), stabilizing the soil against landslides, but also by retaining in the soil a larger quantity of water that by limiting evaporation in the shade of trees, while obtaining a moderate microclimate in arid areas with constant heat. The generic contribution of all forests, including protective curtains to the absorption of CO₂, is not to be neglected. From this point of view, the forest curtains can also be set up in the perimeter of the metropolitan areas, which will develop continuously in the next 40 years, "adding to the world one Paris every week" [41]. This will be a major benefit to increasing people's health, both physically and mentally.

In addition to the aspects of a strictly forestry nature [42], in the context of globalization, the unitary approach and interconnected with the Global Sustainable Development Goals (SDGs, <https://sdgs.un.org/goals>) must also be considered. These are intertwined with the objectives of the European forestry strategy, from which the following policies based on the indicator result, but also recommended good practices that can be applied to forest development in Romania.

These strategies are based on indicators [44] and threats that determine policy approach (https://environment.ec.europa.eu/topics/forests_en).

The policy chapters contain:

1. Deforestation and forest degradation are the greatest threats to forests, contributing to climate change, loss of jobs, energy, economic value, soil degradation, damage to human health, etc. .

2. Monitoring (studies, reports, maps - current and accurate information) for correct and reliable decisions and useful in responding to climate change, preserving and restoring biodiversity and developing the bioeconomy.

3. Forest fires – in 2021 22 of the 27 EU countries suffered forest fires, affecting over 5500 square km, of which, over 1000 square km of protected areas

The policies supported by the indicators have clearly determined objectives, achievable by the proposed measures that must also be applied in Romania.

1. "Promoting sustainable forest bioeconomy for long-lived timber products
 - Investments along the woodworking chain
 - Support for the adaptation of industries to changing forests
 - Incentives for wooden constructions
 - Regulations for long-term timber products: energy/environmental performance, eco-labels,
 - Roadmap to reduce carbon emissions in buildings
2. Ensuring the sustainable use of wood-based resources for bioenergy
 - Sustainability criteria for biomass energy
 - Minimize the use of whole trees for energy
 - Strengthening the sustainability guarantees of forest bioenergy
 - Limitation of State aid for plants using only electricity
3. Promoting the forest-based non-woody bioeconomy, including ecotourism
 - Coordinated programmes on the sustainable production of non-wood forest products
 - Promoting collaboration in the field of ecotourism with sustainable tourism products, especially in protected areas
4. Developing skills and empowering people for a sustainable bioeconomy based on forests
 - Develop programs, knowledge, and skills
 - Promoting education on the role of forests
5. Protecting the last remaining primary and old forests in the EU
 - All primary and old forests are strictly protected - Maintains natural processes in primary forests, limiting extractive human activities
6. Ensuring forest restoration and strengthening sustainable forest management for climate adaptation and forest resilience
 - Key management practices to support biodiversity and resilience through species diversification, regeneration and the creation of new genetic resources
 - Risk management practices to increase forest resilience
 - Prevent climate-related damage and increase endurance
 - Monitor the health of trees and encourage preventive actions
 - Pest control strategies
7. Reforestation of biodiverse forests
 - Increase the area of the forest and with it, the absorption and stock of carbon
 - Plant 3 billion additional trees (AT EU level)
8. Financial incentives for forest owners and managers to improve the quantity and quality of forests in the EU
 - Incentives to strengthen protection and restoration efforts also in public forests
 - Incentives to provide ecosystem services and increase resilience, with payment schemes for ecosystem services
9. Strategic monitoring of forests, reporting and data collection
 - Forest management plans (FMP) for all public forests and several private forests
 - PMFs include risk assessment and management and better integrate biodiversity data
 - Establish criteria to ensure that THE FMP meets the strategists' objectives on climate, biodiversity, bioeconomy and social and rural development
10. A strong gene of education, research and innovation to improve our knowledge of forests
 - Promoting a science-based contribution of EU forests to the ambitions of the European Green Deal
 - Strengthening knowledge on the impacts of climate change to provide guidance for climate change mitigation and adaptation in line with biodiversity targets
 - Holistic approach to new and emerging pests and diseases" [44]

Through this case analysis, combined with the strategic forestry measures of the EU 2030, we highlighted the major potential for increasing the forest areas that Romania has through measures at hand or connected to European funding.

On the other hand, the daily signals give rise in the collective consciousness to a slow application of the recommended good practices, largely a process slowed down by bureaucracy, the lack of a flexible, digitized and efficient administrative personal structure, adaptable to changes and incorruptible. To the same extent, the legislation on the status of the forestry worker can be improved so that incorruptibility becomes an effect of motivation and not a coercive requirement. Regulations can be leaner, clearer, and more logical so as not to create confusion. Ensure better coordination of the Natura 2000 network. Providing information-promotion platforms and programmes for forestry education addressed to civil society and especially to children, more targeted from the point of view of communication marketing, so as to create a correct, objective perception of the importance of the forest and of the need to respect and implement the recommended measures.

At the same time, given the information presented in this work, one can support the obvious role of the forest in the context of our survival. From the air we breathe to the wood we use, we depend on forests for our survival. In addition to providing habitats for animals and livelihoods for humans, forests contribute to the physical and spiritual health of man, to the economic development of the country, through the economic function it performs, as well as to the conservation of soil through forest ecosystems, preventing soil erosion, mitigating climate change. So, for the forest to protect us, it needs our protection,

because by neglecting it, all the benefits offered by it can be canceled.

Therefore, both in terms of economic development and nature conservation, Romania has the advantage of accessing and using the EU's experience, as reflected in the increase in the percentage of forest areas. Thus, to reach the European standards regarding the forest fund, Romania can borrow and apply measures that have as object the protection, management, and sustainable development of forests, from other Member States of the European Union. The impact that these measures can have on the environment and especially on forests in Romania, can lead to: improving and maintaining the biodiversity of forest ecosystems; increasing the area occupied by forests and forest vegetation; achieving the national system of forest curtains by placing them along agricultural and metropolitan land, stimulating the use of high-performance wood harvesting technologies with low environmental impact.

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A Debate on Environmental Management Accounting

Roxana Mihaela SIRBU¹, Mihaela VARTOLOMEI²

Abstract – Environmental Management Accounting (EMA) refers to a set of accounting and performance tools dedicated to companies' actions towards improvement of their environmental impact. Furthermore, EMA deals exclusively with the company's internal costs, as it does not include the external costs of individuals, society, or the economic environment over which the company has no decision-making power. It is recognised that EMA is a relatively new tool in environmental management, which can be defined as the identification, collection, estimation, analysis, internal reporting, and use of information regarding materials and energy flow and environmental costs for both conventional and environmental decision-making process within an organisation. Thus, EMA incorporates and integrates two of the three milestones of sustainable development (environmental and economics dimensions), as they relate to an organisation's internal decisional process.

Keywords: Environmental management accounting, environmental costs, cost management, decisional process

I. INTRODUCTION

Environmental management accounting (EMA) has been designed to support companies to better manage resources, energy and diminish or eliminate their social-environmental impact (e.g., referring to their waste and pollution). EMA has been developed based on specific environmental accounting research and then by providing useful guidelines to support and facilitate the knowledge transfer into organizational practices, as the following:

- Guidelines (IFAC, 2005);
- Procedures and principles of action into practice (UN, 2001);
- Standards (ISO 14051:2011) that assist organization "to better understand the potential environmental and financial consequences of their material and energy use practices, and seek opportunities to achieve both environmental and financial improvements via changes in those practices";
- Workbooks (METI, 2002).

Valuable knowledge experiences are provided by case studies and best practices presented in the literature (e.g., Burritt et al., 2019). In addition, EMA has become an acknowledged approach to fostering manufacturing cleaner production via new and emergent technologies as Artificial Intelligence and circular economy principles (e.g., Chen et al., 2022), design for sustainable manufacturing (Ching et al., 2022), accompanying by circular economy measures (Gonçalves et al., 2022), and spread via the supply chain management efficiency (Bux & Amicarelli, 2022).

From the organizational practice, there is a strong need for sustainable development approaches, but most regarding the environmental impact of businesses. In addition to initiatives such as reduction of carbon footprint and compliance to environmental regulation, companies need to have a better understanding on the financial impact of their environmental-related actions. This is mostly significant in the context of underestimation of internal environmental costs and reduced productivity (Chen et al., 2022). Environmental Management Accounting (EMA) can be regarded as a set of accounting and performance tools dedicated to companies' actions towards improvement of their environmental impact (Qian et al., 2018). EMA deals exclusively with the company's internal costs, as it does not include the external costs of individuals, society, or the economic environment over which the company has no decision-making power. The focus of EMA is on environmental costs because it processes information related to the cost of the environment and, also, explicitly deals with information on movement and consumption of material resources and energy. It is straightforward to specify that a company will primarily use EMA for environmental protection activities, but this type of accounting is not limited to this, the output data being used in a variety of management and decisional processes (as presented by the United States Environmental Protection Agency (1995)).

¹"1 Decembrie 1918" University, Alba Iulia and /Politehnica University of Timisoara, Romania, roxana.sirbu@upt.ro

² Politehnica University of Timișoara, Romania, mihaela.vartolomei@upt.ro

II. ENVIRONMENTAL MANAGEMENT ACCOUNTING: ADVANTAGES AND BENEFITS

Decision-makers in an organisation can use physical consumption information and costs provided by EMA to make decisions that impact both the organisation's financial performance and the environment. It is important to note that, while EMA provides support in decision-making, its implementation is not a guarantee of obtaining financial or environmental performance. However, EMA provides useful information to achieve goals referring to cost minimisation and reduction of negative environmental impact (Gunarathne & Lee, 2021). EMA is considered in the context of a company's environmental strategy, being a major vector for identification of economic benefits, improvement of both environmental and economic efficiency, and for revealing key financial data for strategic optimisation. EMA not only presents the cost data needed to estimate the financial impact of these initiatives, but also data on physical consumption (using raw materials and their renewal rates) that help characterise how these initiatives will influence the environment. Among the environmental initiatives that benefit from using EMA are the following (Jovanović et al., 2022):

- Pollution prevention;
- Environmental improvement design;
- Design and estimation on the costs of the life cycle in the environment;
- Management of products movement from an environmental perspective;
- The environmental perspective on procurement and supply chain;
- Responsibility of the product or manufacturer;
- Environmental-centred management systems;
- Evaluation, testing, and reporting of performance in environmental activities;
- Identification of potential investment opportunities and associated long-term decisions.

However, EMA is not just a tool for managing interaction with the environment among so many others, it is rather a set of principles and methods that provide data on material and energy consumption and costs, indispensable for the success of any activity (Metin, 2009). In this context, EMA is becoming increasingly important not only for environmental management, but also for other routine managerial activities, such as: design of processes and products; allocation and cost control; capital budgeting; the supply process; price policies; and performance evaluation.

Table 1 presents key benefits of implementing an accounting management system for environmental purposes. Besides the prominent benefits regarding diminished environmental impact (through initiatives such as waste reduction, efficient water usage or reduction in energy consumption), implementation of EMA has the potential to stimulate productivity and

improve public perception on the company (Asiaei et al., 2022).

Table 1. Key benefits of EMA

Benefit	Explanation
Improved information support	Separate disclosure of environmental costs (otherwise hidden in the classical accounting systems) will lead to improved information provided to decision-makers, influencing because of the increase of profitability;
Discovery of new opportunities	While the analysis of environmental costs can identify new opportunities, they can be used to save resources by recycling or re-use;
Assistance in the data reporting process	Identification of environmental costs supports organisations in collecting environmental impact data necessary for internal/external reporting;
Increased competitive advantage	Due to the early stage of development of environmental management accounting, its use and appropriate publicity can give a competitive advantage to an organisation;
Improved organisational image	Efforts to reduce environmental costs constitute valuable image capital;
Attracting and motivating staff	By demonstrating that an organisation tries to consider the effects of its operations on the environment, the organisation attracts better staff, also benefiting from a high employee retention rate;
Social benefits	Efforts to reduce costs and influences on the environment (which will lead to a cleaner environment) will generate benefits at the society level.

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Based on the snowball effect, a positive public image and strong reputation generate competitive advantage and the possibility of revenue gains due to consumer preference for purchasing products from companies that are actively engaging in sustainable and environmental-related initiatives (Asiaei et al., 2022). Nevertheless, such initiatives raise employees' awareness on environmental protection and adequate practices, generating improved organisational culture and higher employee retention rate.

III. A DEBATE ON ENVIRONMENTAL MANAGEMENT ACCOUNTING IMPLEMENTATION

Proper identification and collection of physical and financial data enhances decisional process within the

company and environmental data are no exception. Environmental accounting brings more information to management by identifying and quantifying measures such as (Yusoh et al., 2021):

- Obligations associated with significant influences on the environment;
- The cost of alignment with the legal provisions in the field;
- The benefits (or cost savings) achieved from the implementation of environmental management systems;
- Economic advantages of other initiatives (effective growth and improvement of business conduct).

A broad view of the steps an organisation needs to take to implement an environmental accounting system follows the algorithm presented in Fig. 1.

The first step in developing an environmental accounting system is to link environmental management to financial accounting. This is achieved by determining the environmental aspects of the organisation and selecting those that are considered significant and about which managers want information; these are environmental cost objects (Metin, 2009).

The identification of significant environmental aspects for environmental accounting will largely depend on the purposes of the old environmental assessment system. Many organisations have, or are in the process of implementing, environmental management systems that focus on the environmental aspects of the company's activity and identifies the resources and results obtained from those activities (Table 2).

However, the purpose of a management system that favours environmental accounting may differ somewhat from the model indicated by international environmental management standards, such as ISO14001.

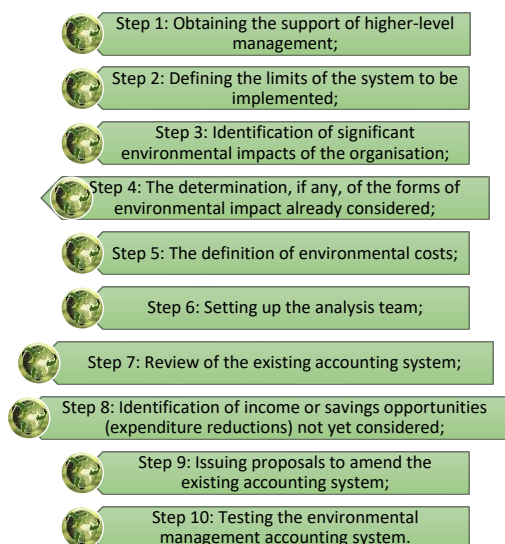


Fig. 1 General steps an organisation needs to take to implement an environmental accounting system.

Table 2. Example of connection between environmental aspects and environmental costs.

Environmental issue	Environmental impact	Potential costs/benefits
Use of electricity	Greenhouse gas emissions; use of non-renewable resources	- activities oriented towards reduction in electricity consumption; - reduction of electricity costs.
Dust	Environmental damage — potential danger for dust to affect the development of photochemical reactions	- fines and penalties from state authorities; - assessment of impact on affected areas; - negative public image.

By identifying the associated activities at organisational or company level, the relationship between environmental management and costs becomes more visible. If the activities, and the resources they use, can be quantified by costs, then the costs and the benefits of managing environmental problems are closer to the level of perception of managers (Yusoh et al., 2021). Financial responsibilities and objectives may also be designated.

Unfortunately, traditional accounting methods do not provide the ideal framework for identifying the necessary information, as they generally focus on the costs of the used resources and on their aggregation, without considering environmental-related activities. As a result, many actual and potential environmental costs will be 'lost' in indirect costs (Jovanović et al., 2022). For example, the labour cost required to remedy an environmental incident may be included (amalgamated) in a financial accounting system, combined with other labour costs, without being allocated to the specific activities that generated them. If these costs have been generated by the correction of an environmental incident, it is more appropriate to identify and allocate responsibility criteria for their control.

Once environmental cost objects have been identified, one further step is to establish a method for quantifying the cost associated with each of them. Identifying the activities associated with each of cost categories provides the link between what happens in the organisation and the costs and revenues generated by the consumption of resources corresponding to each activity (Fuzi et al., 2018). Each activity requires certain resources (work force, vehicles, cleaning materials, etc.), thus comprising a lot of associated costs (Elhossade et al., 2020).

Identifying how resources are consumed within the framework of the activity keeping and selecting the most suitable forms of measurement for the resources consumed an organisation can start to allocate the corresponding costs (resource carriers) on each activity (Fuzi et al., 2018). They are then linked to cost items by identifying the characteristics of the relevant

activities for each cost object, selecting the most appropriate measures for the activity concerned (activity measures) (Elhossade et al., 2020). Traditional accounting methods overlook the activities, at best allocate the cost of resources directly to cost objects (such as the cost of labour). Resource carriers and activity measures sometimes require special monitoring.

Implementation of EMA is, in fact, a process where companies start from using a tool for a specific category of data (e.g., water management) and move towards expansion of applicable areas until the company reaches implementation of a comprehensive and well-established system operating with both short-term and long-term data (Gunaratne & Lee, 2021).

IV. SOME CONSIDERATIONS ABOUT ENVIRONMENTAL ACCOUNTABILITY AND ORGANIZATIONAL PRACTICE

A more recent use of EMA comes from the increasing adoption of ISO 14000 family of standards regarding environmental management. In the complex process of certification for ISO 14001, EMA provides relevant data on potential approaches to benefits measurement (Jovanović et al., 2022).

The first frameworks proposed for environmental management accounting had a series of shortcomings generated, on the one hand, by the fact that environmental accounting includes both monetary and physical elements, and, on the other hand, by the misleading perception regarding the focus of environmental management (Burritt et al., 2002). As presented in the previous chapter, EMA pertains to the corporate perspective of environmental costs and, therefore, does not deal with the ecological implications at the society level. The most comprehensive and generally accepted framework for

EMA was developed by (Burritt et al., 2002) and includes five dimensions:

- (1) External and internal;
- (2) Short-term and long-term;
- (3) Monetary and physical;
- (4) Past and future-oriented;
- (5) Information gathering ad-hoc and as a routine.

The framework (presented in Table 3) has the major advantage of offering a wide array of accounting tools to use for various purposes, from the operational level (where physical and short-term dimensions are more prominent) to strategic planning (where aggregate, long-term data is preferred) (like presented in (Schaltegger et al., 2008)). In addition, the “comprehensive decision-making framework using EMA tools is based on whether information gathered is: physical or monetary; relates to past or future corporate activities; provides a short- or long-term perspective; and is routine or ad hoc. While the framework provides an overview of sixteen possible decision settings (see Table 3), development paths for using EMA tools in specific companies have yet to be examined” (Burritt et al., 2019).

EMA comprises three main categories of tools: measurement tools, auditing and benchmarking tools, and control tools. While the traditional approach in accounting would typically ignore non-monetary benefits of environmental management, EMA consists in framework for assessment of all elements and activities with potential environmental implications (Qian et al., 2018).

To meet environmental targets, companies ought to compare their performance with relevant standards and guidelines, as well as to key competitors’ performance (through auditing and benchmarking tools); nonetheless, the requirement of an established management control system as part of EMA generated control tools to serve the larger companies’ purposes (Qian et al., 2018).

Table 3. EMA framework according to (Burritt et al., 2002)

		Monetary EMA		Physical EMA	
		Short-term	Long-term	Short-term	Long-term
Past	Routine	Environmental cost accounting	Environmentally induced capital expenditure and revenues	Material and energy flow accounting	Environmental capital impact accounting
	Ad-hoc	Ex post environmental costing decisions	Environmental life cycle costing	Ex post assessment of short-term environmental impacts	Life cycle inventories
Future	Routine	Monetary environmental budgeting	Environmental long term financial planning	Physical environmental budgeting	Long term physical environmental planning
	Ad-hoc	Relevant environmental costing	Monetary environmental investment appraisal Environmental life cycle budgeting	Relevant environmental impact	Physical environmental investment appraisal life cycle analysis

V. GENERAL CONCLUSIONS AND FINAL REMARKS

Despite the major benefits and importance of EMA advocated by the research literature, certain studies demonstrated that several companies did not consider justified the cost-benefit ratio for implementation of such an accounting system (Jovanović et al., 2022). Moreover, applicative research on this matter concluded that EMA is implemented as an isolated tool, despite that it should be integrated in the overall accounting activities of a company (Jovanović et al., 2022).

This leads to the conclusion that even though EMA represents a key component for efficient and successful implementation of environmental management systems, without a systematic approach EMA will remain just a remote tool used for the sake of compliance with legislative requirements. In fact, EMA is the best vehicle towards achieving environmental-related goals, supporting key decisions with relevant data and reliable forecasts. In the context of increasing adoption of ISO 14000 family of standards, implementation of EMA tools will become an element of major interest, the main drawbacks regarding its implementation becoming a matter of the past.

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The Gig Economy and Automation. A Brief Presentation with Discussions

Cristian-Marian GAȘPAR¹, Mihaela VARTOLOMEI²

ABSTRACT - In recent years the advancement in technologies has led to the creation of platforms, apps and websites, which became more and more popular after the financial crisis hit the world's economy and companies hired less. A new economy arose, the so-called Gig economy: people would no longer be hired directly from a company, but as free lancers working mainly on web-based platforms. Along with these two trends, the landscape became more and more complicated because of the progress being made towards automation.

Keywords: Gig economy, employment, workers, jobs, labor market, crisis management, flexibility, legal framework

I. INTRODUCTION

With the employment crisis and thanks to the opportunities offered by technological evolution such as websites and apps, new jobs have appeared, the so-called jobs on demand.

In a world tested by the economic crisis, the employment sector and employment contracts have suffered. Finding a job became a real struggle for many. Companies have stopped hiring many people under contract, because of the uncertainty of the market, this has given the opportunity to new ways of working to take over. In such a context, the Gig economy has developed. It is a special system that manages to dispense with the classic open-ended contracts or continuous employment.

In the Gig economy, people work on demand. Thanks to the use of apps and website developed appositely. That is, only when there is a need for our skills and abilities. Some couriers or Uber drivers are clear examples of Gig economy professionals. If we want to make it even simpler, it is the triumph of "odd jobs". Until recently, this type of work situation would not have been considered a good economic option, but given the jobs crisis, many people are now taking advantage of the employment opportunities offered by websites, apps and web platforms.

The real problem of the Gig economy is the protection of workers. Because there are no real contracts, it is difficult for people to obtain employee status with the associated retirement and health benefits. If the Gig economy were to develop further, and market analysts are very excited about this possibility, it will be crucial for people to demand and obtain new regulations from national governments. New laws that allow for greater protection of people working on demand.

For most workers, this is not a primary source of income. The most qualified appreciate the flexibility and remuneration offered by programming, consulting and research assignments. It is true, however, that low-skilled employees without alternative income are more critical: their unattractive tasks are almost impossible to turn into interesting jobs.

To preserve the potential of the Gig economy as a flexible employment opportunity, the political world should refrain from applying the same regulations to it as to the traditional one.

According to many market analysts, the future of the Gig economy will depend on the ability of politicians to adapt laws to these new forms of work. In a way that protects both employees and businesses. It is the creation of a specific category of workers, a kind of freelancer who would stand between companies and workers with fixed contracts. Despite this rather uncertain professional situation, the new category will have to be covered by the benefits enjoyed by people with a regular contract. Such as sickness, paid extras and, in some cases, paid vacations.

In fact, as we're going to see further in this paper work, in the Gig economy world we can identify 5 main categories of Gig workers: the architects and technologists of the platform (founders, highly skilled employees, independent contractors), secondly, the cloud based consultants or freelancers, subsequently we do have the most popular ones, food delivery workers, home repair and care work, micro-tasking

¹ Politehnica University of Timisoara, Romania, cristian.gaspar@student.upt.ro

² Politehnica University of Timisoara, Romania, mihaela.vartolomei@upt.ro

jobs and last but not least social media, content producers and influencers.

This new economy has a global horizon. Even if many advances are still expected concerning the social protection of self-employed workers, this vision of employment has already been adopted by many entrepreneurs. The Gig economy would give way to a "transfer era". A market of globalized and standardized tasks based on the exchange of skills via huge intermediation platforms.

In recent years, governments have taken regulatory decisions in response to the scale and spread of the Gig economy. Indeed, the status of self-employed workers is questioned in a growing number of countries, provoking various court decisions.

The spark of this phenomenon is due to technological advancements. Automation, robotization, artificial intelligence, do digital advances herald a great wave of technological unemployment? Not so sure. First, because humans still have a comparative advantage over machines, so that not all jobs can be automated, far from it. Secondly, and most importantly, because the content of jobs is evolving with digital technology in a way that paradoxically makes them less automatable.

As we proceed further, we will see how many jobs are threatened by the expansion of automation, which creates many uncertainties among workers. We need also to underline that there are jobs keener to disappear than others.

II. GIG ECONOMY – MAIN LABOR PROBLEMS

A. *General considerations*

Scholars, workers' rights groups, and critical commentators are uneasy about the contribution of the Gig economy to a trend towards a casualized and on-demand labor market, with weak or non-existent income security. Work conducted within the framework of the Gig economy generally impedes the application of traditional labor regulations. Gig economy platforms and organizations have been criticized for the structure of work they provide, with work itself being 'time sensitive, algorithmically mediated, tightly controlled by platform owners, yet precarious.

However, most workers have been considered as independent contractors and not employees, and thus lose many of the rights held by employees. The main problems with the Gig economy – that is, pay, rights and conditions – are to do with a gap in our outdated employment laws that Gig companies exploit to gain a competitive advantage. By classing their workers as 'self-employed contractors', Gig employers can neatly sidestep any responsibilities towards the people who work for them. Class them as 'workers' or 'employees' and it's a whole different story: 'Self-employed' Gig work does not come with pensions, sick pay, holiday entitlement or parental leave. You must be a 'worker' or an 'employee' to get these basic rights.

Gig workers get paid per job, not by the hour (at least in part). This means many people are earning less than the hourly Minimum Wage, with no financial security and so many workers live increasingly "on-demand" at the beck and call of an online app– just to make ends meet. This in turn encroaches on essential family time or a healthy social life.

All in all, the lack of the most basic financial guarantees, job security, employment rights or structure around work are a growing source of stress, and physical and mental illness. Disempowered workers are carrying all the risk, while employers get rich on the profits. It's harder for people with insecure work and income to get mortgages and loans, and therefore to plan.

B. *Options for Extending Regulation*

Clarifying and where possible extending law protections and enforcing them more consistently on behalf of all vulnerable workers (including Gig workers), should be an important priority for policymakers. But given the disruptive nature of digital technologies and platform-based business models, extending the reach of instrumental state regulation should also be considered, to strengthen the level of protection for Gig workers. In this regard, at least five broad options might be considered.

1) Confirm and enforce existing laws. The first option is to incrementally expand the reach of the existing legal framework through the use or threat of test cases. This is already occurring, with litigation being launched by or on behalf of Gig workers in several countries. For example, Australia, Airtasker has agreed to recommend that payments for work performed through its platform meet minimum wage benchmarks, in the face of a threat by Unions NSW to take legal action over the issue. Other advocacy organizations are considering similar challenges to other platform businesses, while the Fair Work Ombudsman has announced that it is investigating the treatment of Uber's Australian drivers.

In almost all cases, the litigation that has been instituted or threatened involves endeavoring to establish that Gig workers are employees – but therein lies a problem. The degree of control exerted by either intermediaries or end-users over some workers, and the absence of any meaningful indicators that those workers have businesses of their own, may well make a finding of employment possible. But this is unlikely to be true of every type of crowd work or on-demand work performed in the Gig economy.

2) Clarify or expand definitions of employment - The creeping extension of regulatory protections to new forms of paid work that has been accomplished through recent case law may not be sufficient to provide acceptable levels of protection to crowd-work and on-demand workers. A faster and more direct extension of these provisions could be accomplished through the explicit expansion of the concept of employment. This could involve considering a broader set of activities as equivalent to employment, so that

the category more clearly covers work that is organized, supervised and facilitated by a digital intermediary.

At the very least, such workers should be given the same rights to engage in collective bargaining as employees, without falling foul of competition laws. Alternatively, or additionally, certain kinds of intermediation could be classified as ‘labor hire’ functions, in which case regulations governing the operation of labor hire agencies might come into play. This approach would be more effective still if it were allied with stronger regulation of labor hire providers. Another method to ensure that Gig workers benefit from protections for employees would be to further limit the ability of employers to artificially recategorize employees as contractors.

3) Create a new category of ‘independent worker’ Harris and Krueger (professors at Cornell and Princeton Universities) argue that the features of Gig work are so novel, and the practice so structurally different from traditional employment, that an entirely new regulatory approach is required. Independent, freelance or ‘platform’ workers would be defined, and basic standards of fair treatment described and enforced. These protections would presumably focus on the contractual arrangements between platform workers and their respective intermediaries but might also apply to their relationships with end-users.

4) Create rights for workers, not employees. Most radical option would be to abandon employment status entirely as the trigger for regulating work and apply appropriate protections to anyone performing ‘work’. This more far-reaching vision for regulatory reform would follow the example set in the Australian WHS (work health and safety) legislation. Those laws endeavor to override distinctions in the specific form of the working relationship, to ensure that anyone who ‘works’ is afforded basic health and safety protections.

A similar approach could be used to reconfigure other labor regulations, so that it becomes largely irrelevant whether a worker is an employee in the traditional sense. There is certainly no lack of academic support for the idea of recognizing a ‘law of work’, or a legal framework for the regulation of ‘personal work contracts’ in some broader sense. But while some rights (such as protection from discrimination) lend themselves naturally to a broad application, others would require significant adaptation or redesign to apply to every type of worker. This is especially true of those which carry a financial burden, such as paying a minimum wage, or contributing to a superannuation scheme, or providing paid leave.

5) Reconsider the concept of an employer A further suggestion has been to focus not so much on the status of a worker, but what it means to be an ‘employer’. Prassl and Risak (Law Professors at Oxford and Vienna Universities) explore the different functions that an employer may be said to have. Some platforms, such as Uber, arguably exercise all those functions. But in other cases, they may be split between different entities – most obviously, the intermediary and the end-user.

Where this is the case, the authors suggest that a Gig worker should be regarded as having different employers for different legal purposes – or for some purposes, none.

III. EMPIRICAL ANALYSIS ON GIG ECONOMY AND AUTOMATION

The empirical analysis drafted on the topic focuses on the relationship between Gig economy and automation and how the latter is getting increasingly involved and is shaping the Gig economy and the jobs related to it. Automation is in constant growth and spread: its market was worth 7.34 billion dollars in 2020 and it is expected to reach 19.65 billion by 2026. This boom was generated by the rapid development in social networking, analytics, cloud computing and mobile computing and their need for automation in data center.

The Gig economy is growing even more: in 2021, it was estimated to be worth 347 billion dollars; in the US, 44% of workers get their primary resource of income through freelancing, while 60% of people were engaging with these activities at least weekly.

Considering a five-group classification of different workers using online platforms, it is possible to make a general idea about their relationship with technology and automation. The first type are architects and technologists: workers who develop and maintain platforms’ digital infrastructures.

In this category, founders, highly skilled freelancers, and independent contractors are considered. According to the Bureau of Labor Statistics, the level of the employment rate of highly skilled workers is increasing. At the same time, the percentage of automation risk, which refers to the risk that AI could replace humans in this kind of activity, is low.

The second category refers to cloud-based consultants, who are workers who offer professional services via platforms. Graphic designers, computer programmers and journalists are part of this category. The level of growth of these occupations stays low. The automation risk, on the other hand, is variable: analysts, reporters and journalists have a risk of 9% of substitution; on the contrary, computer programmers have a higher risk of substitution (41%).

While the latter type of job is strictly related to technology and can be affected by development in AI, the first group strongly depends on abilities that can hardly be performed by robots. Some companies, though, started to invest more on software and tools able to write articles by themselves: The Washington Post, an U.S. daily newspaper, developed an automated storytelling agent called Heliograf, which can write down thousands of words in few seconds. It was specifically used during the Rio Olympics in 2016, and it was able to write 300 stories describing sport matches through few hints or keywords. The Washington Post

widely uses the software to write articles about election news, and it sells its license to external users as well.

However, the premise of its developers is clear: Heliograf main intention is to support journalists to write more high value works, not to take their jobs. Predictions about this job are, then, reliable.

The third type is about ride-hail, food delivery, home repair, and care workers. These jobs consist of offering services via platforms and performing them online. For this group, the level of employment is expected to slightly increase. Taken as an example, personal care aides register a 32.6% of employment's growth, while drivers (here considered as a wide category) are expected to grow at a 17.9% rate.

Those jobs have the highest level of automation risk: couriers' risk of automation reaches 88% of risk level, and drivers' risk is 83%. Personal care aides, meanwhile, register a 65% automation risk. Being taken care of by a robot is very hard to imagine. Despite the skepticism about this hypothesis, many robots care takers have been developed in recent years.

Japanese tech companies have largely invested in automated care takers, which perform a wide set of activities, like lifting, transfer and carrying patients, serve as companions, and providing physical assistance and rehabilitation to the elderly. The level of appreciation of the patients toward these robots is, against all the expectation, very high: 80% of Japanese people would prefer being taken care of by robots.

Studies have reported that robots, especially those with puppy appearances, can positively affect the symptoms of dementia in some patients, and keep company to the elderly in care houses. Data accounts that Japan's chronic shortage of workers is a serious threat to the country, and the care takers' sector is affected too. The Health Labor and Welfare Ministry of Japan is expecting an increase in the available spots for care workers, but a shortfall in employment's application. For this reason, is safe to say that these robots are designed to help the already few workers perform their tasks, not trying to steal their jobs.

An interesting study case related to Gig workers involved with Uber and Amazon's companies shows some interesting yet contradictory data: starting from 2014, Amazon was investing both in new contract labor networks and drone patents; Uber followed the same steps: the CEO has expressed his intention to move toward automated vehicles.

At the same time, the Gig-workers are still central for the company: even though the aim of the two companies is to slowly substitute the Gig workers with machines, by developing self-driving vehicles and drone-based delivery's technology, Amazon has shared its commitment in keeping high levels of occupation while using machines and is keeping its promise.

The possibility that drones or automated vehicles will substitute humans in their task, yet to be fully possible, is still afar to be fulfilled. The two companies analyzed are still experiencing a "pre-automation" phase: "[Pre-automation] is the coincident, strategic effort to scale a workforce and monopolize a

distribution network via platform while simultaneously investing in its automated replacement".

It is an interesting theory that states that the fear of societies to be substituted in most of their jobs by AI, is still to be considered distant. The current phase is the intermediate one, in which the slow replacement of workers with robots has recently started and is still far from being completed.

The fourth category of Gig workers is represented by the so-called Micro-workers. They can be defined as all those workers who spend their spare time performing small tasks through platforms in any place in the world.

Analyzing what is stated above in a deeper way, it is important to know that the tasks performed are part of a bigger, unified project carried on by a company. In this context, the company in need of these workers posts the various tasks on a selected platform and eventually performed by these workers. The platform, which is totally automated, essentially connects the companies with the workers, taking away the direct interaction between the parts.

Many important companies make use of these platforms (such as Google, Amazon, Facebook, Microsoft and Uber) to find workers who will help collect and process data to consequently train the companies' artificial intelligence technology.

A wide range of tasks is performed, and some examples could be tasks which help train chatbot to recognize people's regional accents or emotions conveyed by their voices' tone, or tasks where images of different places are to be annotated to help guide automated drones, or simpler tasks such as ticking web's survey boxes. Any people wishing to have a side income can perform these tasks once registered on the platform, and in very few cases specific qualifications or high-level skills are required.

However, in 2017 the ILO – the International Labor Organization – conducted a survey on 3,500 workers in 75 countries highlighted that most of them are more educated than expected: 37% and 20% of them have respectively a bachelor's degree and a Post-graduate Degree, and a mere 18% only have a high school diploma or less. The report in which this survey is included also highlights that there is no correlation between the level of education and the different tasks performed (ILO Survey of crowd workers, 2017).

To give a better idea of what has been stated above, it is possible to give a real-life example of these kinds of platforms. In 2005 Amazon established an online crowdsourcing marketplace, called Amazon Mechanical Turk (AMT), to overcome a malfunctioning of algorithms which could not recognize product listings of Amazon website.

In the case of Amazon, once a worker logs onto the platform, it does not have access to all the available tasks. In fact, the worker must meet certain criteria which have been defined by the company, posting the task itself. According to a 2019 estimate, more than 250.000 people have performed at least one task on AMT. So, it can be easily understood how these

platforms, while gathering human workforce, have been developed to collect data to improve current technologies and in the future eliminating part of the job done by these workers.

The last type of workers which can be identified in the landscape of Gig economy are the so-called “Gigfluencers” and the content producers.

First, it is necessary to define what an influencer is to later define the “Gigfluencers”. An influencer is a person who works mainly on social media platforms and, initially unpaid, tries to earn an income thanks to the contents shared and eventual sponsorships with companies. Consequently, “Gigfluencers” similarly to influencers try to make a profit out of published contents, but do not want this activity to be their full-time job, but merely a side-job allowing them to earn some money.

Concerning content producers, in this context are taken into consideration those who create written material such as advertisements or products’ descriptions. It has been possible to find data regarding the expected employment growth for this type of worker, which is approximately 8.5%.

A similar percentage can be seen also for the automation risk these workers face, which is 8%. As low as it may seem, the risk of automation could grow in the future. In fact, in 2018 the marketing department of Alibaba developed an Artificial Intelligence-powered copywriting tool with the aim of producing descriptions for products on Alibaba Website.

The development of this tool has been possible thanks to the natural language acquired from already existing samples. This tool is incredibly fast and it can produce 20,000 lines of descriptions in less than 2 seconds. Any company can have access to this tool and in the future, it could easily represent a threat to all of those people earning part of their income from these jobs.

As far as concerning the world of influencers, the advancement in technology and automation has made the creation of an avatar influencer possible, thus posing the question of whether human being Gigfluencers could be replaced.

First, we would like to draw attention to a survey that has been conducted by MediaKix, a Santa Monica-based influencer marketing agency, which found out what is the general feeling about avatar influencers and the automation of influencer marketing. Mediakix has conducted a survey interviewing marketing professionals and wondered whether the influencer marketing can be automated. More than 70% percent of them think that it can be automated, however there will always be a human component. Only 4% of the respondents think that it can be fully automated.

But as already said avatar influences have already been created, thus a path towards automation.

In 2016 Lil Miquela entered the world of social media posting her first picture on her Instagram profile. This avatar has been created by a Los Angeles-based start-up, called Brud, and created a stir among social media users. She resembles a human being, act and talk

as one, however she is not. Lil Miquela is not simply an avatar with pictures of herself on social media, she is an influencer all-round, as she has also released singles on Spotify and created a clothing line.

IV. CONCLUSIONS

To conclude this paper, an important question to pose is “what does the future hold?”. It has to be acknowledged the fact that we are not yet living in a completely automated world, but we can say in an pre-automated world. As it was possible to notice when analyzing Amazon and Uber cases, these kinds of companies are investing towards a future of automation while trying to monopolize distribution networks via platforms.

Focusing on the Gig economy we can say that many jobs will be lost while others will be created thanks to automation, as it was highlighted by a study conducted by SAP Fieldglass and Oxford Economics. In this study has emerged that by 2023 many sectors of the economy will see a rise in demand for Gigworkers.

For example, concerning support services there will be a 17% growth in demand compared to 2020. In Manufacturing the growth is expected to reach 25%. Another report, conducted by Forrester and named “The Future of Work” which considered both the Gig economy and automation states “Automation will accelerate the need for and rise of the Gig economy. Automation will also enable the Gig economy to exist by connecting buyers and sellers.” The same report estimates that by 2030 job losses of 29% will be witnessed, against a job creation rate of 13%.

The human workforce will be important for many years to come, and many companies try to retain workers to grow. Along with many others, Amazon is an important supporter of the human workforce and has in fact a high level of employment and tries to offer many jobs to different categories of workers, from warehouse workers to engineers.

Very interesting is also the point of view of Amazon’s CEO Jeff Bezos concerning the future of workers and automation: he believes that technological development will not represent a real threat for workers. However, another important personality, Elon Musk, Tesla and Space X CEO, has a different point of view: in his opinion what the future hold is frightening: in most of the cases people will be only required to write and develop AI software until this software won’t be able to write themselves, leaving essentially workers without an employment.

In conclusion, the future is still uncertain and the era of pre-automation we are living in now still leaves space for the Gig economy to grow, despite the steps which have been made towards the development of automation. The future, however, represents a question mark.

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Legal Aspects Concerning Prostitution

Cristian-Marian GAȘPAR¹, Caius LUMINOSU²

Abstract - This research aims to draw attention to the phenomenon of prostitution both from a legal, social and economic point of view. The study first presents the contemporary social phenomenon, followed by a brief history and the current situation. Subsequently, the legal classification in the New Romanian Criminal Code is presented and two comparative studies of two states (Germany and the Kingdom of the Netherlands) are presented, where prostitution operates in legal forms, with a separate legal regime of application. In the last part of the research is presented the management of prostitution phenomenon in Romania and the conclusion.

Keywords: Prostitution, legal aspects, social aspects, economic aspects, examples.

I. THE CONTEMPORARY SOCIAL PHENOMENON OF PROSTITUTION

1.1. Brief introduction

Prostitution, by its definition, involves the sale of the sexual act itself. Money is the major motivation for people willing to practice this profession, as most come from low-income backgrounds. For people who practice this profession, prostitution is a potentially well-paid occupation, but depends very much on the practiced form. People who practice street prostitution hardly get rich from prostitution and suffer numerous problems, but prostitution still provides them with a source of income they are unlikely to receive through legal occupations because they have little commercial ability to sell (***, 2015).

Despite this financial motivation, most people don't get to practice this job, and researchers have tried to understand why some people do this. Because the people in question are not eager to be studied, we do not yet have studies on different types of prostitution and will probably be missing for a while.

Most studies in this profession involve people who practice street prostitution, even though they make up only about 20% of all prostitution. Methodologically, the best way to clarify this causal question would be to randomly assign young people to practice or not to practice this profession and then study what happens to

their psychological health afterwards. For many reasons, this type of study would be extremely unethical and will not be possible, at least soon. In the absence of such studies, it is difficult to find out exactly what causes some people to practice prostitution, but it is considered that in many cases the poor economic situation is the answer (***, 2015).

However, prostitution is extremely common in many developed countries as well: The United States of America, China, Japan, France, Germany, the Netherlands, Belgium, Spain, Canada, Austria, etc. But in most cases, those who practice this profession come from much poorer neighboring states. Foreigner prostitutions prostitution are more likely to pursue their activity in states where prostitution is legal, possibly encouraged, but above all well-paid (one of the best examples being Germany) (Zaharie, 2011).

The act of prostitution itself is a matter of the mentality and morality of the practitioner, and the regulation of occupation is related to the evolution of mentalities, social tolerance, pragmatism and the purposes of political power. In literature it is also stated that prostitution and perception of this phenomenon also belong to a certain cultural and historical specificity of each individual people.

To the greatest extent, in terms of social tolerance, we encounter approximately the same situation in some peoples for centuries to this day. In Western Europe and Latin America, the practice of prostitution has been and is generally tolerated by states (except for the period of historical experiments: Inquisition, Nazism, Communism), while in Asia and Islamic space, the act is punishable even by death in extreme situations.

If in Romania the main cause of prostitution is the precarious economic situation and the lack of well-defined professional perspectives, in the world the situation is more complex, the causality being much wider (Zaharie, 2011).

1.2. Current situation

Even today, people who practice prostitution are often marginalized and stigmatized by society (Weitzer, 2013). In countries where prostitution operates in legal forms, in recent years parliaments

¹ Politehnica University of Timisoara, Romania, cristian.gaspar@student.upt.ro

² Politehnica University of Timisoara, Romania, caius.luminosu@upt.ro

have implemented various bills to protect people who practice prostitution legally by law. Among the main points of this type of projects are compulsory license - clubs, brothels and escort agencies will only be allowed to operate with a license from the competent authorities, unannounced controls, raising the minimum age from 18 to 21 for the people who practice prostitution.

Coming even closer to today, more exactly in 2020, the SARS-CoV-2 pandemic has had severe and immediate effects on people practicing prostitution. Because of social distancing, quarantine, neglect of governments towards low-income people, the ability of these people, already marginalized enough for their job, to secure the minimum income necessary for survival is threatened (Farley, 2020).

From a legal point of view, at European level, prostitution has been clearly recognized as a problem of gender equality and human rights by MEPs and even implicitly as a form of trafficking in human beings (PE, 2013), but the other institutions have not yet undertaken to legislate on it (Anouk, 2019).

This is certainly due to both the sensitivity of the subject and the fact that in practice it would be extremely difficult for EU Member States to agree on a change in their system regarding prostitution (Sanders et al., 2009).

1.3. Legal classification of prostitution

In modern times, the term prostitution is often used when describing different types of sexual relationships that are provided at a set price, and in most cases, it is the direct contact of the practicing-client person, not a virtual contact. This term is therefore difficult to define and the definition depends largely on legislation (Grdan, 2017).

In the Romanian law system, if the old Criminal Code, in force until 2012, considers prostitution “The act of the person who procures his/her means of existence or the main means of existence, practicing for this purpose sexual relations with different persons, shall be punished by imprisonment from 3 months to 3 years.” (Romanian Parliament, 1968), the new Criminal Code no longer includes the criminalization of the act of practicing prostitution itself.

For better regulation, the High Court of Cassation and Justice published in 2016 a decision on the correlation of Article 213(1) of the Criminal Code and Article 213, paragraph 4 of the Criminal Code, it follows that the person determined to maintain sexual relations for the purpose of obtaining patrimonial benefits must be urged to have sexual relations with several persons, not with one. The maintenance of sexual relations with one person, even for the purpose of obtaining patrimonial benefits for himself/herself or another, is not considered prostitution. Nor is it regulated the situation in which a person causes several persons to have sexual relations with the same person, in exchange for obtaining patrimonial benefits, and unlike the old regulation, the new regulation of the crime of pimping criminalizes the determination to

practice prostitution, and not only the act of urging to practice prostitution (Craiova Court of Appeal, 2014).

Although prostitution itself has been decriminalized, there are still crimes related to it. Among the serious offences related to prostitution can be listed: pimping, bullying against good morals and trafficking in human beings.

Prostitution varies enormously in social forms and contexts. The personal health and safety of the people concerned depends to a considerable extent on the context and location where they offer their services and the intensity of their working life.

Almost everywhere there are laws designed to limit and control the prostitution industry, but it rarely succeeds. Prohibitive legal rules may temporarily limit the activity of prostitution but may also lead it to practice in more hidden forms (Neave, 1988).

Laws punishing people who practice prostitution only reduce their power to protect themselves and leave them vulnerable to officials and law enforcement. (Allen, 1990) Where prostitution is regulated by licensing, the persons concerned outside the system are twice compromised in terms of their health and safety, with potential danger to public health and large-scale effects (Moreton et al., 1999).

Regarding the measure of the economic basis of prostitution, public health outcomes are generally better where persons practicing prostitution have a higher status measured by both legislation and their ability to earn a satisfactory income, the persons concerned can be selective about their clients and services and be supported by health services with adequate resources and interest representation organizations.

II. STUDY CASE: GERMANY

2.1. Presentation of the legal framework

One of the legislative objectives of the Law on Prostitution (GLP) is to allow the persons concerned to conclude legally valid employment contracts by establishing an employment relationship subject to social security contributions, to give them access to social security and, in general, to improve their social protection. It is also necessary to exclude the previous consequences in accordance with the criminal law of the conclusion of such employment contracts. Punishing “promoting prostitution” would be replaced by punishing “exploitation of persons practicing prostitution”. The German Criminal Code should be reviewed and limited to cases involving the restriction of the personal or financial independence of the person practicing prostitution (Bundestag Printed Papers 14/5958).

However, the prostitution relationship gives rise, according to paragraph 3 of the GLP, to either a legal employment relationship or a legal relationship of provision of services, both of which have the particularity of giving rise only to a unilateral obligation to pay on the part of the

client/beneficiary/employer (German Federal Government, 2007). The latter is not entitled to the benefit. If the benefit has been fulfilled, only the person practicing prostitution is entitled to the agreed remuneration.

The client can only request, in accordance with the provisions of civil law, the refund of the remuneration if it has been paid in advance. The customer has no right in case of defective performance of the service/work. The GLP states that a legal obligation also arises when in the context of an employment relationship a person is available for such activities, which gives rise to a special employment relationship between brothel operators and the person practicing prostitution. He/she is therefore entitled to payment of the agreed salary if they are available for a specified period to perform sexual acts.

The unilateral nature of those legal relationships referred to above is such as to protect persons practicing prostitution, preventing them from being forced to perform sexual acts.

In order to qualify as an employment relationship subject to social security contributions, the statement of reasons for the GLP states that it is sufficient that the activity of the person practicing prostitution has the following characteristics: the employer's limited right to give instructions or orders of service, a very high level of responsibility of the person concerned, a certain period of integration into the workplace, the person concerned may not be obliged to perform that work (German Federal Government, 2007).

Legal employment relationships in brothel units must be balanced by appropriate monitoring mechanisms, as "entrepreneurs" are not expected to give up old routines, tried and tested in a grey legal area, without an external incentive, and then perform the legal duties of an employer (e.g., continued pay, paid leave, social security contributions) in the future (German Federal Government, 2007).

Prostitution and brothel operators consider financial losses linked to the establishment of an employment relationship subject to social security contributions to be a problem. Moreover, most sex workers solved the problem of social security coverage without having to be in a dependent job, and therefore the majority were not motivated to enter an employment contract.

The unions share this view. There have been several attempts to actively support the discussion process initiated by the Prostitution Act and some attempts to consider the interests of prostitutes. For example, the union VER.DI (United Services Trade Union) supported the development of prostitution employment contracts by drawing up a sample of the contract. However, VER.DI sees this sample of employment contract more as a basis for discussions on the preparation of prostitution standards. The union said it was important for the idea of employment contracts to gain a foothold in prostitution and the discussion of "prostitution as a job" to be conducted further (Behrens, 2002).

An empirical investigation by Soffi K I concludes that the possibility of dependent employment relationships should be continued in order to improve the social and financial security of sex workers, even though at present most of them prefer to work as freelance professionals. Most of these people want to maintain their independence (and self-determination) and this should be taken seriously. This desire is undoubtedly linked to the very specific nature of the workplace, which is very personal, very intimate and very physical.

In the view of the Federal Government, the further debate on the issues involved should include examining how to define prostitution in the legal context of self-employment and how, given the legal preconditions, self-employment could guarantee the social protection of persons practicing prostitution and how their working conditions as independent professionals could be improved (German Federal Government, 2007).

In addition, efforts should be made to improve the effective frequency of checks on compliance with social security and tax obligations in the field of prostitution, to induce those who de facto have the role of the employer to effectively assume their role in the legal sense.

Care must be taken in order not to allow legal (criminal) regulations (so-called owner's privilege) (German Federal Government, 2007) to give privileges to those employee/employer relationships in which the employer avoids assuming any functions of an employer. "Owner's privilege" means that exploitation by the owner of a home is punished more gently than committing the crime of pimping (German Criminal Code, Section 180a (2) No. 2, cf. Bundestag Printed Papers 14/5958). However, all forms of exploitation of sex workers from which the victim cannot extract themselves deserve the same punishment.

2.2. Social security of sex workers

In social security legislation, such insurance cannot be refused or reduced because of a profession, whether regarded as immoral if the legal framework for practicing it exists. To benefit from social security, it is sufficient to have an individual employment contract.

Even after the entry into force of the law, sex workers in some brothels did not have access to social security in practice, because a brothel owner for whom they worked under conditions constituting an employment relationship subject to social security could be punished in accordance with the old Section 180a (1) No 2 of the German Criminal Code. Therefore, to avoid the risk of prosecution, brothel operators have often chosen to hire these people in something like self-employment (*Scheinselbstständigkeit*); they also did not report existing de facto dependent employment relationships to the social security authorities. Therefore, the legislator also chose to repeal Section 180a(1) No 2 of the German Criminal Code in order to ensure that

persons practicing prostitution can enjoy social protection (German Federal Government, 2007).

The consequences of the Prostitution Act regarding the Social Insurance Act were the subject of a joint statement issued by the main social security organizations on 18 November 2002, in which they stressed in detail the impact of the Prostitution Act on insurance, contributions and registration issues.

The declaration also described the criteria applied to distinguish between self-employment and dependent employment in prostitution, which were amended with the entry into force of the Prostitution Act.

Consequently, since the entry into force of the law on prostitution, the criteria generally used to define the term 'sex worker' have been classified as meaning that the law provides that the employer's restricted right to issue instructions does not constitute an obstacle to the establishment of an employment contract.

The statement also makes clear that the obligation to be insured, to pay contributions and to be registered by persons engaged in prostitution dependent activity entered into force at the earliest from 1 January 2002.

The position of social security companies is consistent because the Prostitution Act created the possibility of establishing an employment relationship as a sex worker for which social security contributions must be paid.

It is welcome that this statement clarified an issue that was initially unclear after the entry into force of the law on prostitution, i.e., the dilemma of whether additional applications for insurance contributions could be made in the case of employment relationships that existed before the entry into force of the Prostitution Act. The problem was solved by entering a cut-off date: additional applications for insurance contributions due to dependent employment as a prostitute can therefore only be downgraded on 1 January 2002 (German Federal Government, 2007).

Consequently, concerns expressed by prostitution practitioners and brothel operators can be seen as unfounded. However, they play a rather important role in practice.

If the person concerned works independently, then all social security regulations applicable to other self-employed professionals also apply to him/her. Although some jobs might be subject to social security contributions, sex workers had the possibility, like any other freelancer, to pay voluntary contributions to the state pension scheme or to apply for treatment as a mandatory insured person and then to pay compulsory contributions. However, the latter presupposes that self-employment is not merely of a temporary nature and that the application to be treated as a compulsory insured person is submitted within five years of self-employment. The fact that the person is classified as an entrepreneur according to tax law is sufficient because the tax classification of a job is an important indication of the existence of a dependent or independent job. Those who pay voluntary state pension contributions, however, do not have access to other social security schemes. For persons practicing prostitution, the five-

year deadline for submitting applications for compulsory pension insurance on application shall start at the earliest on 1 January 2002 (German Social Security Code, Section 4 (2)).

Therefore, sex workers working on their own would, in principle, have had the possibility, prior to the entry into force of the Law on Prostitution, to pay voluntary contributions or, on request, compulsory contributions to the State pension scheme.

Access to statutory health, unemployment and pension insurance as a sex worker was legally guaranteed for these persons later with the entry into force of the Prostitution Act if it is established that he/she is in an employment relationship in a brothel or brothel-type establishment (German Federal Government, 2007).

III. STUDY CASE: KINGDOM OF THE NETHERLANDS

3.1. General presentation of the legal frameworks. Comparison study and debate

The core of the current laws and policies on prostitution in the Kingdom of the Netherlands is to decriminalize those forms of prostitution in which adult persons engage on a voluntary and consensual basis, while any form of coercion, threat, violence, deception or abuse of authority in relation to the practice of prostitution by a person, as well as sexual abuse of minors, is strictly prohibited and sanctioned. The basic principle is to treat sex work as work, including the application of labor law to the sexual industry and labor rights attached to sex workers (Wijers, 2008).

This is achieved through a combination of administrative, labor, criminal and civil law: regulating sexual affairs through administrative law (licensing system) and labor law; preventing and combating trafficking in human beings and other forms of violence or abuse, prostitution of minors or operating by foreign citizens without the necessary work permit, through a combination of labor law, criminal law, administrative and economic law; improving the position and working conditions of the persons concerned by including requirements in the licensing system regarding working conditions, safety and health and prohibiting the use of coercion, deception or abuse (Wijers, 2008).

Those who choose to work as sex workers must be able to do this work healthy and safe. Prostitution is different from human exploitation or trafficking, but these and other abuses take place in the prostitution sector. Trafficking in human beings is a serious violation of human rights. An inadmissible violation of human dignity, integrity (physical and/or mental) and one's personal freedom. The legislatures of the Kingdom of the Netherlands are therefore doing their utmost to prevent and combat trafficking in human beings, including in sexual work, to protect and support

victims and to punish perpetrators (Dutch Parliament, 2021).

Obligations to this end are enshrined in both national and international regulations, such as the Criminal Code, human rights treaties, the UN Palermo Protocol (on the prevention, suppression and punishment of trafficking in human beings, especially women and children) (UN, 2000), the Warsaw Convention (anti-trafficking in human beings) (Council of Europe, 2005) and the EU Trafficking in Human Beings Directive (European Parliament, 2011).

Unlike Germany, prostitution in the Kingdom of the Netherlands is done based on a license received from the local authorities for the employer and a work permit for persons wishing to practice prostitution. Abuses occur much more often in the case of sex work than in other sectors, so the government of the kingdom must also prevent or reduce these abuses as much as possible based on its duty to protect the population. The government rightly sees a task for the sex services industry to reach an acceptable industry, in which men and women who are not obliged to do this work by third parties to ensure their livelihoods and especially safety (Dutch Parliament, 2021).

The purpose for which the sexual work license was designed and the inclusion of this license in a national register can help to combat abuse. For example, a better picture of the sector can be obtained, the system has a preventive effect, as an authorization can be refused if the operator or manager is subject to a circumstance in which it can be considered unfit for the proper functioning or management of such a business (e.g., a previous conviction for a crime of violence, sexual crime or trafficking in human beings) (Dutch Parliament, 2021).

As regards persons practicing prostitution, the permit applies both to self-employed persons and to those who work for or for an employer. It is a personal permit valid throughout the country. Authorization is requested by the local authorities of one of the municipalities designated by the Ministry of Justice and Security and is valid for two years.

A permit may be applied for if the applicant is at least 21 years old. The government believes that young adults between the ages of 18 and 21 should be kept out of prostitution because this protects their sexual integrity. A 21-year-old is better able to make an informed decision about sex worker work, is more resilient and less economically dependent on the sex worker profession.

If these conditions are met, the authorization interview with two specially trained civil servants will take place. A prostitution permit will be refused if the applicant is not autonomous enough to work as a sex worker or if the commission has serious suspicions that the applicant is obliged to practice prostitution. Approval criteria are included in the Ministerial Regulation (Dutch Parliament, 2021). After a positive assessment, the prostitution permit will be included in the national register. The register shall contain at least the social security number of the person concerned, the

telephone number at which he can be contacted for work activities and the unique number of the permit.

With the inclusion of the data of persons who have applied for a prostitution license in a national register, the personal data of such persons are processed. The fact that someone is a sex worker highlights the person's sexual behavior and the processing of special personal data is rightly necessary (European Parliament, 2016). In general, the processing of this special category of personal data is prohibited. The prohibition does not apply where processing is necessary for an important reason of public interest, in accordance with the law of the EU Member States. However, proportionality must be guaranteed and the essential content of the right to the protection of personal data must be respected. Appropriate and specific measures must also be taken to protect the fundamental rights and interests of the data subject (Dutch Parliament, 2021).

The explanation of this way of protecting personal data, in particular names, is that the social position of prostitution practitioners is vulnerable and that they often face stigmatization. Various associations believe that registration and the licensing requirement can have a stigmatizing effect on prostitution practitioners, from which other negative consequences may arise. The requirement of the permit and the registration are therefore also, in their view, a violation of the right to respect private life (Council of Europe, 1953).

In the light of these assertions, the Netherlands legislature concluded that the registered person can easily be tracked by municipal officials and supervisors based on a unique authorization number and telephone number, the name being necessary but remaining classified information. The inclusion of the data of the person concerned in the register must be considered necessary to combat abuses in the prostitution sector. Such a practice of processing personal data is justified and is necessary to protect prostitution persons from various abuses (Dutch Parliament, 2021).

3.2. Social security of sex workers

With the implementation of the new law on prostitution in the Kingdom of the Netherlands, local authorities were delegated the social and health insurance responsibilities of prostitution persons, and sex workers became eligible for social rights as well as for the payment of taxes and social security (Outshoorn, 2012). There was a legal basis for the interviews to be conducted by local authorities and to renew the prostitution permits every two years.

The main aim is to pursue sex workers included in the municipal health services system (GGD, Gemeentelijke Gezondheidsdienst) to prevent abuse by different operators. Currently, there is no legal obligation for municipalities to provide accessible and anonymous assistance to sex workers free of charge through municipal health services, although there are many municipalities that have already set up some help points for people practicing prostitution at municipal

health services or another health organization (Dutch Parliament, 2021).

However, the law provides that a sex worker may receive information and care anonymously and free of charge, at least in municipalities where a prostitution permit may be applied for. The place where this happens is generally referred to as a “care post” and this may also include the municipal health service. With such a provision, various institutions, including the municipal health service, are already accessible to sex workers, and legal regulation now guarantees this possibility for them together with the government expressing the importance of adequate care (Dutch Parliament, 2021).

Holding a prostitution permit is not a condition for having a conversation with a specialist at a care post. According to specialists in the field, this would create additional barriers for the person practicing prostitution to have the courage to visit nursing homes, such as the municipal health service, which is not favorable for careful long-term supervision. When applying for a permit, the person concerned is aware of the opportunity he or she must have conversations with specialists at different health centres if he or she has problems in the future. Conversation can be a start for building a trusting relationship of the person practicing prostitution with state authorities. It is also essential that sex workers be able to talk about abuses in a care post without fear, with the prevention of abuse and forced prostitution being the main purpose of these centres (Dutch Parliament, 2021).

If the employee of a care post suspects that a mistake has been committed during the interview or subsequently, he may also refer the person to other forms of social assistance or even to the police. With this, conversations can also help identify abuses such as human trafficking. During the conversation, an attempt is made by providing information to put the person practicing prostitution in a position to take measures to protect his or her integrity. The information will never be shared with third parties without the person’s explicit consent (Dutch Parliament, 2021).

IV. PRELIMINARY CONCLUSIONS ON THE PRESENTED CASE STUDIES

As a short conclusion, here are two countries where prostitution is legal, but with distinct legal rules of application. In the case of Germany, prostitution is regarded almost as a profession like any other, people who practice prostitution are thus able to conclude legally valid employment contracts by establishing an employment relationship subject to social security contributions, to give them access to social security and, in general, to improve their social protection (German Federal Government, 2007).

However, there are certain specific rights and obligations to protect the dignity and bodily integrity of sex workers. This particularity only gives rise to a

unilateral payment obligation on the part of the customer/beneficiary/employer.

The latter is not entitled to the benefit. If the benefit has been fulfilled, only the person practicing prostitution is entitled to the agreed remuneration.

The client can only request, in accordance with the provisions of civil law, the refund of the remuneration if it has been paid in advance. The customer has no right in case of defective performance of the service/work. In the case of social security, the legislation provides that such insurance may not be refused or reduced because of a profession, whether regarded as immoral if the legal framework for practicing it exists. To benefit from social security, it is sufficient to have an individual employment contract (Dutch Parliament, 2021).

On the other hand, in the Kingdom of the Netherlands there is a different legal approach from Germany and much more inclusive to work in the sex industry. In the Kingdom of the Netherlands, prostitution is carried out based on a license received from the local authorities for the employer and a work permit for persons wishing to practice prostitution. The design of the sexual work license and the inclusion of this license in a national register can help to combat abuse.

For example, a better picture of the sector can be obtained, the system has a preventive effect, as an authorization can be refused if the operator or manager is subject to a circumstance in which it can be considered unfit for the proper functioning or management of such a business (e.g., a previous conviction for a crime of violence, sexual crime or trafficking in human beings) (German Federal Government, 2007).

Although the legal provisions of how prostitution is regulated are much different between the two countries, there is a common point: Counseling Centers. Through these centers, sex workers find extremely important help from the state. In these places, the people concerned can come and ask for the necessary help in case of abuse and forced prostitution.

In our opinion, if prostitution is legalized in Romania, this law is a combination of the two laws of the countries presented in the case studies. There is an employment contract whereby the persons concerned can benefit from various State insurance (German Federal Government, 2007), as in the case of Germany. But there should also be a system for granting revolving prostitution permits, as in the case of the Kingdom of the Netherlands; this makes it much easier for prostitution workers to be supervised by the authorities if they are subject to abuse by brothel operators. And as there are also in the two countries, there should be Counseling Centers in Romania, where the persons concerned should always find a large helping hand from the Romanian state.

V. MANAGEMENT OF PROSTITUTION PHENOMENON IN ROMANIA

5.1. Public opinion studies on legalization of prostitution in Romania. Issues related to the draft of permissive regulation

In Romania, the exact name of commercial sex practitioners is not known, prostitution being prohibited by law; police raids lead to fines for street sex workers, instead being tolerated erotic massage parlors that often hide the practice of prostitution. In 2003, the WHO estimated a number between 23,000 and 47,000, women and men who practice commercial sex in our country (Preda. 2009).

The public opinion in Romanian society regarding the acceptance of the legalization of the prostitution has changed with the passing of the years. Another survey, conducted in 2003 in collaboration between the Institute for Public Policy in Romania and Gallup Romania on a representative sample of 1500 people, showed that 52 % of the interviewees agreed to legalize the prostitution (IPP, 2003).

After the revolution of December 1989, in Romania, there were several failed attempts to regulate and legalize prostitution.

The most extensive and well-documented project was submitted to the Romanian Parliament in December 2010 by MP Silviu Prigoana, a project that was carried out with the inspiration of German regulations in the field. However, this legislative proposal failed to obtain the necessary support for its adoption, with only 30 votes in the Chamber of Deputies (Romanian Parliament, 2010).

The draft law proposed to amend the legislation so that an existing phenomenon such as prostitution, a reality that is demonstrated even now that it does not have a truly effective solution for the moment, can be treated legally. The conditions under which these activities can be carried out are provided by the draft law, the manifestation of activity in the public space being reduced to the extreme.

The draft law defined the notion of “authorized sexual activity” (legal abbreviation-ACSA) as “sexual activity carried out by the person holding the legal authorization, carried out on the basis of an agreement between the parties and rewarded with a pre-established payment”. Homosexual relations were excluded from the concept, but also abnormal sexual relations.

The common law applicable to that special law would have been laid down in Government Emergency Order No 44/2008 on the conduct of economic activities between authorized natural persons, individual businesses and family businesses.

The legislative proposal imposed several well-structured requirements regarding the legal framework for carrying out the activities of sexually authorized persons, the person providing and the beneficiary. Thus, sexual activities had to meet the following requirements (Zaharie, 2011):

- Be authorized in accordance with the procedure laid down in the special law supplemented by the ordinary law applicable to this field;

- Comply with rules of hygiene and discretion; persons practicing prostitution were required to undergo medical examination and to maintain confidentiality regarding the identity of clients;

- The services take place independently or in an organized setting, in tolerability houses or brothels;

- The building in which the activity is carried out must be intended exclusively for this purpose, and in its building, there are no minors.

Service providers needed to be at least 20 years old and operators at least 18 years old. The only minors that could occur in this situation are beneficiaries who must be only 16 years old. The question arises whether allowing the 16-year-old to benefit from sexual activity does not conflict with Article 1 of the “Convention on the Rights of the Child ratified by Law no. 18 of 1990 republished” (Zaharie, 2011).

According to Zaharie C.G., this situation is likely to be a physical or mental injury to the 16-year-old minor. Payment for sexual services, even if it is lawful and regulated by the state for various reasons, is not of its nature and can positively influence the education and ethical and moral development of the 16-year-old minor. Prostitution, even if it will at some point be accepted by the legislative power, cannot become a factor of education and morality for a minor. If the person providing the service is required of the age of 20 and the client, to ensure the moral form of the minors, the age of majority should be reached (Zaharie, 2011).

On the other hand, if the practice of prostitution is established as an economic activity in a legal context, then does not infringe the right to work of the 18-19-year-olds through this prohibition? Certainly, for the reasons set out in Article 1 of the Convention on the Rights of the Child, the practice of prostitution between persons under 18 could be prohibited, as in the Kingdom of the Netherlands the minimum age for the possibility of practicing prostitution under legal conditions is 21 years.

The legislative proposal also if persons practicing prostitution, in addition to meeting the age condition, must be medically fit, legally authorized and subject to the control of activity, medical and sanitary control, and administrative and public order control. (Romanian Parliament, 2010).

In carrying out a first form of control, the Ministry of State has authorized doctors who can ascertain whether a person is fit to practice sexually authorized activities. The central authority also issued legal rules on the conditions under which a person is considered fit to exercise that activity. It is also considered that the medical examination should have been monthly and should be highlighted in the ACSA Charter, held by prostitution practitioners, and in the “Confidential ACSA Register” of the inspecting physician. The medical examination would have been carried out for a fee; the funds intended for the Single National Fund for

Sa-Nation Insurance. The Ministry issued the minimum standards of hygiene and working conditions regarding toleration houses and brothels, and the public departments delegated specialized staff for this monthly control of the conditions in the premises where the activity in question is carried out. The results of the checks would have been highlighted in the “Register of Hygiene Conditions Recording” on permanent basis in the premises, but also in a register held by the Public Health Directorate (Zaharie, 2014).

The Ministry of Administration and Interior, through a specialized structure, would have kept a centralized record of the authorizations for the exercise of this activity issued at national level. The record was kept electronically and contained the authorization and the documents on which it was issued. If the authorization to exercise this activity had been cancelled three times, the accounting structure for the exercise of the ACSA would not have given a favorable opinion for a new authorization (Zaharie, 2014).

5.2. Economic and Tax Aspects of Legalization of Prostitution

Considering that in Romania there are 40,000 practicing persons, who have on average 2-4 clients per day, working 5 days a week and 11 months a year, which have an average tariff of 100 lei per “prestation”, results in an annual taxable income of 44,000 to 88,000 lei per sex worker, and the entire field would earn between 1,760,000,000 and 3,520,000,000 lei per year or between 410,000,000 and 820 million euros per year, bringing the budget between 65,600,000 and EUR 131,200,000 a year. The amount will also be added to this budget of social contributions, as well as any other fees charged to fund programmes such as counselling centres to help the people concerned with possible abuses. The question that raises controversy, however, is how many paid sex workers will choose to work legally, thus paying all their contributions. How many of these people will choose to pay these contributions and how many will continue to work illegally? Looking at this situation from the perspective of some states where prostitution is already legalized, it follows that many of these people will continue to work illegally, with no taxes and taxes, they will choose to pay these contributions in part, and they will choose to pay them in full. This location must be analyzed considering the high level of social contributions in our country (Zaharie, 2014).

The existence of such counselling centres is vital in the case of legalization of prostitution in Romania. With the help of these centres, people who choose to practice prostitution will be urged to choose work in legal forms, explaining in this way that by paying contributions to the state, they will be able to benefit from benefits such as social and health insurance, but above all from more security and much stronger protection from the state against possible abuses.

CONCLUSIONS

Prostitution is a social phenomenon that has existed since ancient times. It's a phenomenon that can't be eradicated, but it can still be kept under control. The prohibition of the practice of prostitution does not lead to the disappearance of the phenomenon itself, evidence of prohibitive regimes in which, although prohibited by law, prostitution continued to exist illicitly, trafficking in human beings, pimping and sexually transmitted diseases being very difficult to control.

One of the possible solutions to control, prevent and reduce all risks related to prostitution is the legalization of commercial sex and not of sex intermediaries. But imposing such a measure in the absence of an analysis based on the experience of other states, but also depending on Romania's particularities, could generate undesirable effects.

In the contemporary period, in the countries where prostitution was legalized and regulated, this approach was carried out by political formations of liberal, Christian-democratic, social-democratic, generally under the conditions of societies based on democracy and tolerance. A top-ranking position occupied the neoliberal political current that feminist movements were joined by it. Prostitution was born, grace and cultural tradition, as a permanent and sometimes useful component of human society.

In countries where prostitution is legalized, the persons concerned who provide such services, on their own or in a brothel, but legally, and therefore pay taxes, benefit from social insurance, leave, pension, generally all rights under the labor law of the respective countries. Countries in which prostitution is legalized regard it as work, replacing prostitution with commercial sex work. No one in the world has legalized intermediation of sexual services (proxenetism). Efforts are also being made worldwide to reduce child sex tourism.

Even if commercial sex is illegal, public authorities will have to assume the consequences of this social phenomenon as: sexually transmitted diseases (including HIV), abandonment of children at birth, social exclusion of people practicing prostitution including from social and medical services.

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Visions on Green Management and Mimicry through Neuromanagement

Ancuța-Elena PAVEN¹, Diana Florina ROBESCU², Ilie TAUCEAN³

Abstract – This paper aims to present a consistent literature review on green management and mimicry related to their implications and knowledge exploitation in organization management. There will be debated aspects about the implications of these concept on defining a modern and actual vision as part of organization's management strategy. Finally, authors propose that these two concepts to be studied through neuromanagement methods and tools, action which is still in the research phase. This approach is based on the new management trends that introduce neurology and psychology to innovate the strategies of the human resources department.

Keywords: Green Management, Behavioural Mimicry, Neuromanagement.

I. INTRODUCTION

A. Green Management

The Knowledge Revolution has led to the selection of personnel concerned with the environment, its protection through measures at all levels and at all levels of the organization, meaning the concern of the modern economy of Green Management (GHRM). The Industrial Revolution is the cause of this concern, which seeks solutions to the problems generated by the progress of technology to the detriment of the environment. Environmental Management Systems (EMS) have been developed since 1990 to pursue sustainable development. This integration of EMS in the field of human resources is called Green Human Resource Management (GHRM).

Furthermore, GHRM practices contribute to the organization's and its workers' social equality, health, wellness, and well-being, as well as the accomplishment of economic stability and environmental balance. Previous research has investigated the impacts of GHRM on employee behaviour, environmental performance, and organizational financial performance.

However, the state-of-the-art in GHRM reveals a scarcity of research on the social sustainability factor of organizations. Using Ability, Motivation, Opportunity (AMO) theory and Social Identity theory, sustainability literature has advocated the mediating function of employee green behaviour at work.

To achieve GHRM adequate practice, employees must be trained in this regard and cultivate the spirit of greening, protection of nature. We are referring to the connection between man and nature, known since ancient times and proven by researchers, for example, those in Rochester and Illinois.

The most beneficial relationship for both parties is the harmony between man and nature. In Romania, the interest for the environment is low, placing us in the last place among EU countries, with the highest degree of pollution. The largest social movement in Romania in this regard is Let's Do It, Romania! alongside the global Let's Do It World movement. They give great interest to students and seek to act at the educational level, from an early age on awareness of the need to protect nature. Several studies and analysis done by consulting companies have underlined that organizations are more attentive to their employees right from the recruitment phase, being interested in the knowledge they have about the environment and the behaviour, the attitude towards protecting the environment. DRH has been focusing for some time, in addition to green management and on the protection of employees' personal data, in line with the requirements of the GDPR, General Data Protection Regulation. Alignment efforts consist of managing the large volume of personal data, migration, which leads to a staffing crisis, and how to recruit and select human resources [4].

The most important and severe trend in human resources is the digitization of processes. This new phenomenon requires changes in organizations, quite rapid changes, which some companies are reluctant or do not have the resources to achieve. More recently, digital natives have begun to enter the labour market,

¹ Politehnica University of Timisoara, Romania, ancuta-elena.paven@student.upt.ro

² Politehnica University of Timisoara, Romania, diana.robescu@student.upt.ro

³ Politehnica University of Timisoara, Romania, ilie.taucean@upt.ro

meaning generation Z, descendants of the baby boomers and generation X. These are people who can easily adapt and place as the main criterion to do what

they want, characterized by flexibility and orientation towards substantial gains.

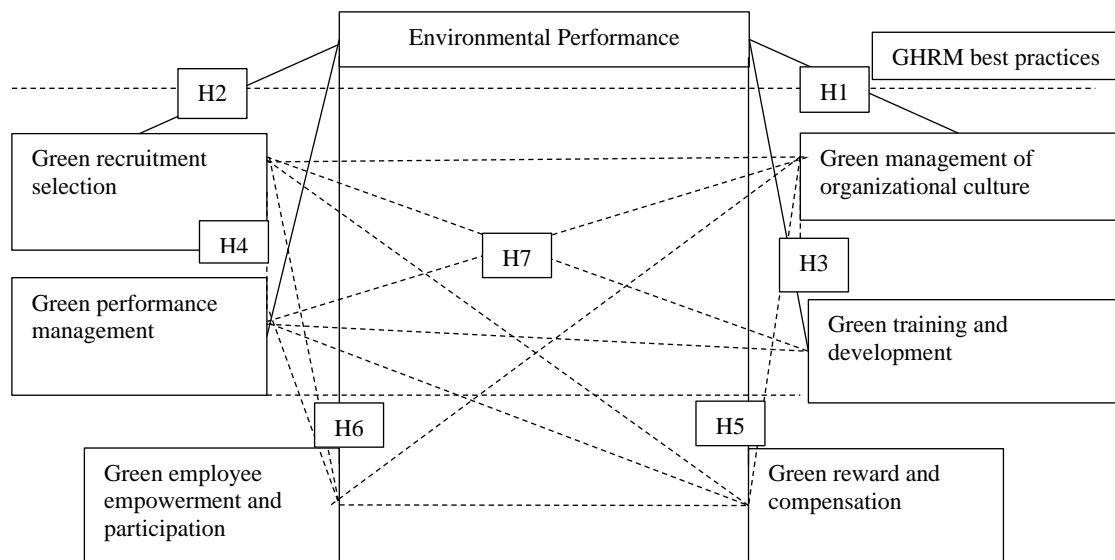


Fig. 1 Environmental performance (a theoretical model).

As this generation becomes more predominant in the labor market, technology is increasingly activated and brings about changes in employee management policy. Gradually, automation of many processes was introduced within the Human Resources Department by introducing various human resources software to facilitate human resource management. Another modern way is to use platforms such as Synchrony HR Software, which run recruitment, personnel management, or evaluation processes. These platforms also perform timekeeping, payroll, internal communication, manage training programs, provide analysis, and reports. The use of these platforms facilitates the work of employees, especially that work that requires repetitive processes, such as payroll or time. Quick access to data and flexibility of use are some of the advantages of cloud software.

The human resources department plays an increasingly diverse and vital role in the overall strategy and development of the current organization. The term HR Business Partner is frequently used as a new trend in the development of personnel strategies. Therefore, the recruitment process makes more use of social networks, such as LinkedIn, Facebook, websites, and employment branding, to find the ideal employee, to the detriment of participating in events and announcements.

Candidates for a new job are also oriented by the employer's reputation and brand, in addition to their own aspirations, and employers want open-minded, well-trained employees.

From 2018, the legal bases of work were laid at home through a legislative project, and Romanian companies began to practice this way of working, especially in the period 2020-2021, during the Covid-19 crisis. situations in which some employees

were teleworked, while the rest of the team was physically present, time, and situation that required good cooperation, communication, and adaptation of this form of work, where employees are required to be a unitary whole for the smooth running of the organization.

The HR department processes an impressive volume of personal data; therefore, it must make efforts to be compatible with the standards imposed by the GDPR data protection regulation. For employees, data confidentiality is very important, as is the support that companies offer in the pandemic context. Many employees preferred employers who provided them with the necessary resources for teleworking or salary incentives for those working in the workplace.

Employers had to deal with special situations, prepare a crisis management, adopt work flexibility, provide resources, transparent communication, and introduce financial and moral support programs for employee health. For companies where work could not be carried out at home, it was necessary to change the structure, adapt the methods, rearrange the spaces and provide sanitary material for permanent disinfection. Job seekers are increasingly interested in the aspects that the organization offers in pandemic conditions, and what strategy the organization used during a life-threatening crisis.

The future is forecast with changes in increasing access to information, companies' tendencies to specialize, emphasis on ecological techniques, environmental protection, pursuing quality standards, training well-prepared generations to cope with transformations and find efficient, fast solutions innovative. Companies seek to operate with little staff, operative, because human resource costs can be high, especially as they seek more and more moral and

professional satisfaction, in addition to the financial motivation of raising salaries or various rewards of this kind and employee training process.

The new trend is for the employee to be a good operator, moderator, facilitator, etc., not only executor as he was and to master foreign languages very well (not only to communicate with third parties, but to be able to get information with the necessary). It is possible that some professions will disappear, be replaced by new ones, demanded on the labor market so digitized. Planning, simulation and decisions have played a big role in the organization, along with counselors, experts, and psychological training is as important as the employee's specialized training.

The apparent links between human resource management and organizational performance have formed the basis for what is strategic Human Resources Management (HRM), which means that HR managers work hand in hand with line managers to implement and manage the process of meeting company objectives, regardless of whether they are financial goals, visions or others. The key elements of the HRM strategy for any company will depend on the company's activities and its development stage; however, most HRM strategy statements should include career and staff development to help employees reach their full potential and acquire the skills needed for the organization to achieve its goals; organizational development supports the organizational culture that promotes the desired performance and a stimulating and supportive job.

The concept of European human resources management appeared because there are more and more national companies run by managers of other nationalities. Therefore, HRM expands its tendencies to some management practices in some international fields. In this context, the Department of Human Resources (DHR) is concerned with finding suitable people for jobs, attracting talent, and communicating a good image of the organization, and neuromanagement can contribute to them, as a neuroscientific approach applied to management problems to investigate behavior and managerial processes by analyzing brain activity.

B. Organizational mimicry

Mimicry is the center, the heart of management, because this field works with the man who adopts mimetic behaviors. In the context of innovation, this ability and voluntary attempts to reproduce the behavior of another person, can lead to spectacular effects in imitating good behaviors, such as green actions. According to Rene Girard, imitation is at the origin of everyone, generating desires, while the need is native. Girard's triangle, the mimetic triangle is made up of the desired object, the mediator, and the mime (see: <https://mimetictheory.com/key-terms/triangular-desire/>).

Through behavioral mimicry, people are influenced by their leaders. If we randomly analyze a work team,

we will notice that its members resemble their manager, in terms of work, characters, even clothing, and attitude. Where the boss is competent and dynamic, so will his team.

Strategies with good results adopted and tested deserve to be replicated at the level of other organizations, taken as models of innovation. When organizations innovate, there are common regularities, called innovation patterns, which prove the existence of this mimicry, presented by the measure of common sense and improperly expressed because mimicry itself means imitation without deviations, meaning, non-innovation. The desire for mimicry can also be studied through neuromanagement by subjecting the subject to questions about the subject and evaluating the responses by monitoring brain activity, pulse, and respiration to demonstrate the relationship between what the subject says and what he thinks [8]. With the introduction of human resource management software, the HR department has undergone changes, in the sense that the processes carried out by the staff until then have begun to be performed by software. The latest trends show that DHR is becoming more and more involved in the business strategy of the organization, having an increasingly strategic character.

C. Neuromanagement

DHR also has the option of using neuromanagement, still in the research phase, to find out, with the help of medical devices, reactions and opinions of candidates for a position or of their own employees. Neurology, imaging, and psychology are very important areas for what modern management can achieve.

At first, a managerial strategy is just a map, a mental image, made up of all the knowledge described. Emotional knowledge has led to the emergence of neuromarketing as part of neuromanagement, a developing field that monitors consumers' reactions to marketing stimuli, reactions found by medical methods such as MRI, EEG, MRI showing the relationship between decision and human brain. Professor Qingguo Ma, the head of the Neuromanagement Laboratory at Zhejiang University, established the neuromanagement hypothesis in 2006.

Neuroentrepreneurship offers new perspectives in the substratum of entrepreneurs, who study the neural basis of innovation, the entrepreneurial mentality in intentions below what is on the surface. This new field aims to research the human brain and its areas with the help of connectors, images, and devices with interest in the decision-making process of human subjects to identify their entrepreneurial abilities [6].

To understand the complex structure of the brain, the theory of the three brains, triune, was developed by neurologist Paul MacLean in 1950. The brain is a reptilian R complex that is responsible for the most primitive and reflexive functions, to which we have added the neocortex and the limbic system. 5% of the mass of our brain is occupied by the R complex, which

ensures survival and sees the known as something that can solve and the unknown as something dangerous.

The main task of the reptilian brain is to respond to environmental stimuli, regardless of past or future, and generate involuntary responses, such as heart rate and respiratory rate. The limbic system is the source of our emotions, that is, of emotional intelligence. The cortex is the ideas and inspirations, it helps us to process the information correctly [3].

II. RESEARCH METHODOLOGY

A. Defining the Research Hypothesis

A good documentation of the human brain outlines the specific principles that can be introduced in advertising messages to optimize information processing. In neuromanagement, conscious participation of the tested human subject is not necessary, but only his consent for the investigation of the mind [2].

The evaluation of jobs performed through bioelectric measures is an innovative method by which managers in the human resources department are supported in the recruitment process, training, the need to be dismissed, the establishment of a work team for a project, the mobility of staff within the organization, opportunities for advancement, availability for green management, attitude towards the personal model of the manager (mimicry).

The study can be performed to assess the level of interest in GHRM and the agreement or disagreement about behavioral mimicry. Why both interests in this study? GHRM is a new topic, with an impact on the whole world, because an employee's thinking about the environment affects everyone around him, being a problem that involves us all, because it has major repercussions. If we all lived in the spirit of environmental protection, the impact of human actions would be less on the environment and implicitly on the environment than on humanity. Another area of interest in this study is the manager's model for his employees, how he is perceived, and how important is its role for candidates for a position, for the results of an organization after all.

The objective is to classify the subjects into one of the following categories:

1. Interested in the environment;
2. Neutral to the environment;
3. Willing to train in green management;
4. Disinterested in the environment, and for the other problem the categories are: 1. mimicry is important; 2. neutral response; 3. mimicry is harmful.

B. Research Methodology

The research has a target group aged between 25 and 60 years, who hold different positions in different organizations, precisely so that the result is a general one for our country, not targeted on a specific category. The purpose of the research is to accept green management and mimicry by analyzing the data provided by the tools used. As methods, we will use a series of questions in the form of a questionnaire that will be applied to the target group.

Other instruments that could be used, with the consent of those tested, would be the electroencephalogram of EEG associated with software, such as Human Neocortical Neurosolver, MRI, CT scan, which would discover the true feelings of the respondents, not just the rational response.

C. Results analysis

Most of the interviewees were found to know the concept of green management and unanimously know and believe in the benefit of applying green measures on the job. The problem is that it does not really apply.

Respondents stated that they only occasionally participate in greening actions. 50% of the respondents responded that they are interested in training courses in the field of green management, 30% are very interested, and the rest show a disinterest in this improvement. 70% agree that the manager is a role model, and 30% completely agree. Most, 80%, believe that it is extremely important that members of a work team have the same working methods and are compatible.

In equal percentages of 40%, the interviewees know or do not know if the management strategies of the organizations where they work use mimicry, while 20% do not know this aspect. Half of the respondents would agree with the use of medical methods such as an encephalogram to study their behavior according to certain stimuli and 30% are undecided.

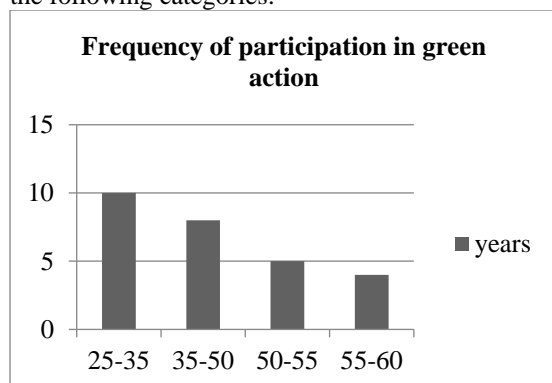


Fig. 2 Frequency of participation in green action

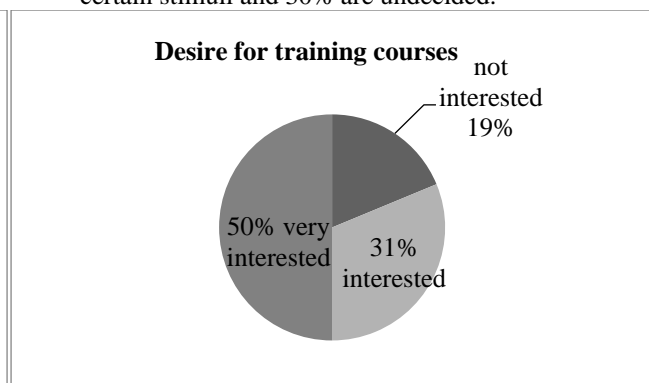


Fig. 3 Desire for training courses

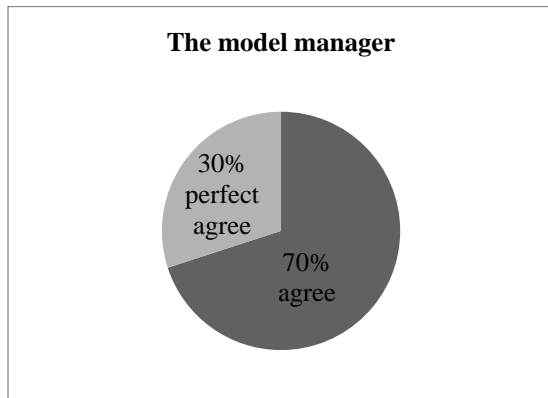


Fig. 4 The model manager

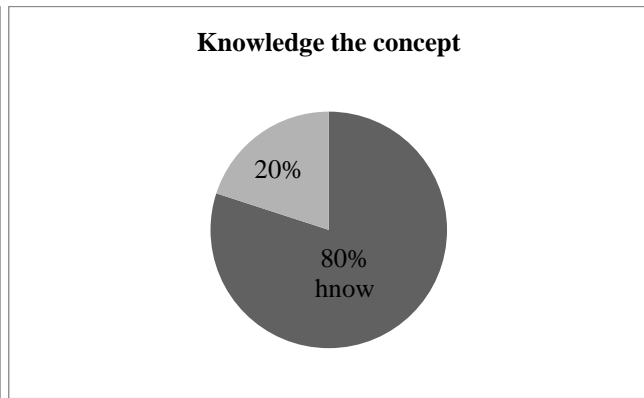


Fig. 5 Knowledge the concept

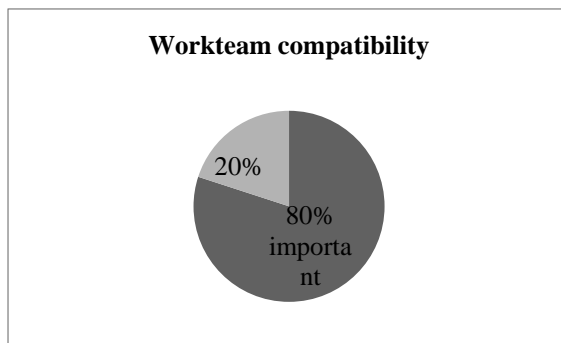


Fig. 6 Workteam compatibility

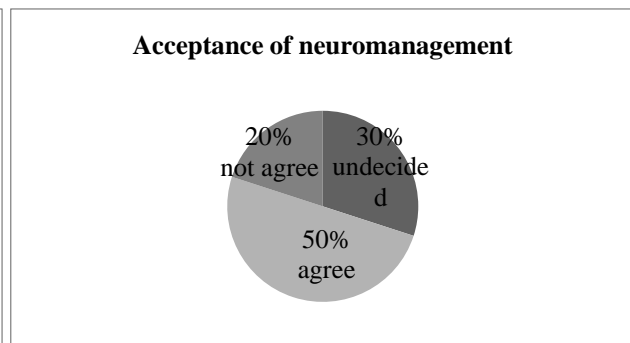


Fig. 7 Acceptance the concept

Therefore, following the study we can classify the subjects into the category of those interested in the environment, willing to train in green management, and regarding the other issue we noticed that imitation is important for employees in Romania. The three concepts: GHR, mimicry and neuromanagement are new and under investigation.

III. CONCLUSIONS AND FINAL REMARKS

This study was based on the theoretical part of the three concepts, Green Management, behavioral mimicry and neuromanagement, and on the application side I conducted a study through which I wanted to find out the opinion of respondents from various fields of activity, functions and age. about the concepts mentioned and whether he would agree to find out more using neuromanagement, particularly the question referred to the use of the encephalogram. As neuromanagement is done only with the consent of those tested, there are problems related to this aspect. With more knowledge, things could be simplified and better understood.

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The Current Study of Sustainability Approach in Technical Universities

Delia ROZOVLEAN¹, Florin Constantin BOGDEA², Andreas DOBRE³,
Mircea ZAMFIRESCU⁴, Laura-Crina COCA⁵

Abstract – Sustainability is a national and international approach, addressed by many organizations. In the university environment, actions are reduced and less valued. That is why this paper proposes to present the current state of involvement in the sustainable development of some universities that form the Romanian Alliance of Technical Universities (ARUT). This article will evaluate the implications of each university in the development of sustainability to align the university environment with the demands of the environment. The three responsibilities of sustainability, economic, social, and environmental, will be assessed. The qualitative assessment is used for the universities that form the ARUT group. The results of the research show that the 5 universities play an active role in inter-university cooperation on a national and international scale, but they can improve on environmental responsibility and a good example could be issues regarding the exploitation of geothermal energy, since not even half of the potential of water is used thermal to produce thermal energy. This research presents ratings among the 5 universities, estimates made based on online information provided on their websites. At the end of the research, a basic concept model for university sustainability is presented.

Keywords: sustainable development, technical university, ARUT, sustainable university, students, environment, efficiency

I. INTRODUCTION

Sustainability is the idea that anything can survive and grow without consuming future generations' natural resources [1]. This is based on knowing the needs of the present without jeopardizing the resources of future generations. Therefore, this concept is made up of 3 big responsibilities: *economic*, *social*, and *environmental* [2].

Economic development is a relatively simple form of sustainability. People tend to achieve economic development to raise living standards and to protect and improve the environment, both for themselves and for others future generations.

Social development is the fair distribution of opportunities between generations. Any company should invest in providing staff benefits as well as a safe work

environment. Companies that offer jobs that involve employee burnout are not sustainable [2].

Environmental protection, being the most discussed responsibility, refers to any activity that contributes to maintaining or improving the environment [2].

Sustainability is an organizational development direction that applies global principles and integrates 17 global sustainable development objectives with 169 targets. Any organization, regardless of its size or shape, can get involved in sustainable development. There are no restrictions on involvement, being a voluntary approach. Organizations show an increased interest in the last period, being a condition of the business network. In the last period, the universities also started to get actively involved in their sustainable development. Actions are carried out, smaller than in the private sector, but which will increase in intensity in the future. The sustainable university is the institution that educates the interested parties for sustainable development, responds to society's challenges, develops the university campus, reduces the footprint of greenhouse gases on the environment, empowers students and employees to interact and act, applies the principles of sustainability making it an element central in the university.

Sustainable development in higher education is based on the management of processes and activities, always with the fundamental and long-term goal of improving the services provided by state universities [3].

Currently, sustainability is no longer just a principle of action to make resources more efficient in an economic sense, but rather the responsible support of the environment in technical, economic, and social implementation. Sustainability involves the selection and involvement of technologies that solve problems so that future generations do not have to live worse than current generations [3]. Universities contribute to the training of students with the help of recent applications based on modern systems. The digital transformation in education requires the involvement of sustainable management because they can adapt to the changes imposed by new technologies [4].

Virtual learning is becoming very important for universities nowadays. Therefore, universities need to investigate how they could combine humanities with virtual learning to ensure good collaboration and engagement. Virtual learning technology has grown at an accelerated pace in recent years [4]. The teaching staff play an essential role in the preparation of students. An extremely significant indicator of the sustainable development of a university

¹ Politehnica University of Timisoara, Research Center of Engineering and Management, Romania, delia.rozovlean@upt.ro

² Politehnica University of Timisoara, Research Center of Engineering and Management, Romania, constantin.bogdea@student.upt.ro

³ Politehnica University of Timisoara, Research Center of Engineering and Management, Romania, dobreandreas@yahoo.com

⁴ Politehnica University of Timisoara, Research Center of Engineering and Management, Romania, mirceasamfirescu@gmail.com

⁵ Technical University "Gheorghe Asachi" of Iasi, Romania, laura-crina.miraute@student.tuiasi.ro

educational institution is the institution's active participation in the relevant fields on a national and international level, the growth of an external network of collaboration, the organization of highly esteemed academic events, and the development of an external collaboration network [4].

The paper is structured in three parts. In the first part, the universities that make up ARUT are presented. The next part includes the evaluation of the universities' activity for sustainable development. The third part includes a conceptual model for university sustainability based on the assessment from the second part. The research concludes with conclusions, discussions, and limitations.

II. METHODOLOGY

The purpose of this research is to qualitatively assess the implications for the sustainable development of the universities that form the ARUT group. For this estimation, the qualitative assessment of university websites and strategic reports is used. The main activities of the universities on the three responsibilities of sustainability are presented below: economic, social, and environmental.

III. EVALUATED TECHNICAL UNIVERSITIES

The *Politehnica University of Timisoara (UPT)* was founded in 1920 and became an advanced research university. Today it is one of the Romanian schools with tradition, recognized nationally and internationally, both through the work of generations of teaching staff and through the exceptional work of prestigious academics, having 10 faculties [5].

The *Politehnica University of Bucharest (UPB)* is the oldest and most prestigious engineering school in Romania. The tradition is linked to the year 1818, when Gheorghe Lazar founded the first technical school, and teaching was done in Romanian. It was located at Sfantul Sava in Bucharest. It currently has 15 faculties, and its name was changed to Politehnica University of Bucharest. [6]. „The founder of education in the Romanian language in Wallachia, the great enlightener and patriot Gheorghe Lazăr, establishes in 1818 in Bucharest, at the Sfântu Sava monastery, "an Academy with science, even in the language of his mother", within which the first technical school in which were trained, in a special group, the first engineers,, [7].

The *Technical University of Construction of Bucharest (UTC)* is the continuation of the "School of Bridges and Roads" (with a faculty degree) established in 1851 in Bucharest, today having 7 faculties [7].

The *Technical University of Cluj-Napoca* includes twelve faculties which is split between the two university hubs of Cluj-Napoca and Baia Mare, plus extensions in the nearby cities of Alba Iulia, Bistrița, Satu Mare, and Zalău. The Bologna system-organized educational offer consists of continuing education courses as well as bachelor's, master's, and doctoral degree programs [8].

"In Moldova in 1562, the first attempt was made to lay the foundations of what would become, much later, higher education, through the establishment of the Latin School in Cotnari. Through the education reform of 1948, the Polytechnic Institute "Gh. Asachi" from Iasi, which operated until 1993 when, as part of the reform of higher education in Romania, the Polytechnic Institute "Gh. Asachi" from Iasi becomes, on May 17, 1993, the

"Gheorghe Asachi" Technical University of Iași (TUIASI), and today it has 11 faculties [9].

IV. RESULTS

This part includes the results of the assessment on the three responsibilities of sustainability. The public information found on the websites of the universities is presented. From the evaluation of the activities, a general conclusion was formulated regarding the involvement of each university on the three responsibilities of sustainability.

1. Politehnica University of Timisoara, Romania

UPT has several implications for sustainable development which are presented below [5]:

Economic responsibility

- ✓ It contributes significantly to the development of the entire region.
- ✓ The year 2020 was the year of the Polytechnic in Timisoara.
- ✓ In 2022, the foundations were laid for fruitful collaborations between companies and the university to generate an ecosystem of entrepreneurs to strengthen the local entrepreneurial spirit, business partners joining with the experience they possess.

Environmental responsibility

- ✓ UPT constantly adapts to the latest trends required in the field and supports principles of sustainable development.

Social responsibility

- ✓ UPT leads to the fulfillment of the competence requirements of the social environment by ensuring professional training at university and postgraduate level.

2. Politehnica University of Bucharest, Romania

UPB has several implications for sustainable development which are presented below [6]:

Economic responsibility

- ✓ To develop experts in a range of technical domains who can apply important information from the sciences, engineering, and the humanities and advance technology.
- ✓ UPB aims to develop partnerships with universities in the EU as well as with the most prestigious ones in the world.

Environmental responsibility

- ✓ Educating engineers in management skills, adapting to the demands of the market economy and new technology, and advancing the values of sustainable development and environmental protection.

Social responsibility

- ✓ It encourages training that is fully competitive and tailored to a society's needs, subject to the integration process into the European and global Community.
- ✓ University professors and lecturers can benefit from a sabbatical year if they have carried out research grants, have worked in the university and have acquired scientific and didactic prestige through evaluation, keeping their title holder status, benefiting from a basic salary, without being able to have another employment contract.
- ✓ Projects are carried out for the community for the training of skills and abilities that are not fully

covered by the university curriculum (for example the EduFinUPT project carried out during 2021-2022).

3. Technical University of Construction of Bucharest, Romania

UTCB presents several sustainable development implications which are outlined below [7]:

Economic responsibility

- ✓ The general development of UTCB is a symbol for the significant rise in the university's national and international profile, as well as the improvement in the efficacy and efficiency of student learning services.

Environmental responsibility

- ✓ Organization of the "Think smart, create green" contest. Creating infrastructure and urban areas that are future-proof is essential to the goals of smart cities.
- ✓ An extremely important activity regarding the dissemination of research results, but also regarding a future international collaboration activity – it is the participation of UTCB in collaboration with the Romanian Geoexchange Society in the Pan-European Network of Centers of Excellence for Surface Geothermal Energy used in Civil and Historical Buildings [10].

Social responsibility

- ✓ UTCB's fundamental mission is to „be a national center for training new generations of specialists and performing scientific research in the field of construction”.

4. Technical University of Cluj-Napoca, Romania

The university presents several implications in sustainable development which are presented below [8]:

Economic responsibility

- ✓ Some aspects of the research environment include performance rooted in the perspective of the economic environment, visibility, and international cooperation, but also scientific originality and interdisciplinarity.

Environmental responsibility

- ✓ The study topics range from information technology and communications to renewable energy sources and ecology, with an emphasis on global objectives and views.

Social responsibility

- ✓ One of the main goals of the university is to expand the space of education and research to

Europe and the rest of the globe through a continuous process of internationalization.

5. Technical University “Gheorghe Asachi” of Iasi, Romania

The university presents several implications in sustainable development which are presented below [9]:

Economic responsibility

- ✓ TUIAȘI trains engineers with a high professional qualification, able to respond quickly and efficiently to the innovation, research, and development requirements of the economic environment.

Environmental responsibility

- ✓ The role of the university is to create a coherent but flexible system that generates knowledge and allows its functional integration into environmental protection structures.
- ✓ They also started a project with the theme: “Heat exchanger with uniform thermal flow integrated as a cold source in heating-air conditioning systems equipped with heat pumps”, where they have in mind the realization of a heat exchanger with uniform thermal flow.

Social responsibility

- ✓ To provide graduates with a genuine shot in the labor market competition, the university seeks to foster critical thinking and innovation. In addition, the institution speaks to every member of society to prepare them for lifelong learning.

V. THE DEVELOPMENT OF A CONCEPTUAL MODEL FOR UNIVERSITY SUSTAINABILITY

Based on the qualitative assessment carried out in the previous chapter, the main attributes of a conceptual model can be systematized. The main attributes identified on the three responsibilities of sustainability are:

- Social: community, university ethics, students, university campus, research education, power of employee-student interactions, student families, occupational health, and other stakeholders.
- Environment: setting and infrastructure, water management, resource efficiency, greenhouse gases, transport, other universities.
- Economic: national and international projects, international collaborations, research, education, formal and non-formal learning experiences.

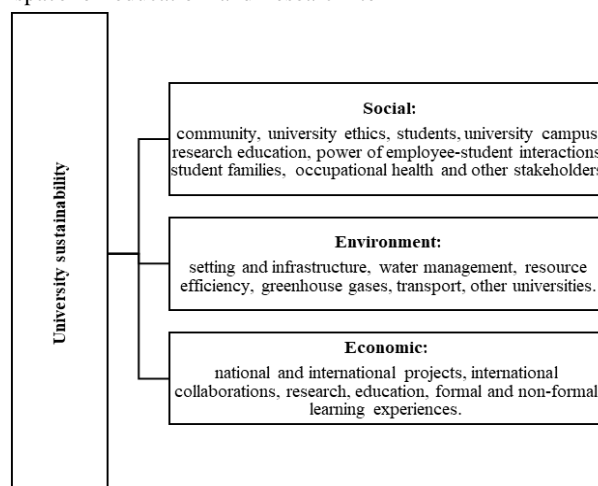


Figure 1. Conceptual model for university sustainability

VI. DISCUSSIONS AND CONCLUSIONS

This section presents the main findings of the study on sustainable development, through a brief examination of the information gathered from the websites of the 5 technical universities in the ARUT group in Romania, as also mentioned in the research methodology.

The Politehnica University of Bucharest has set out to train engineers who can easily adapt to the current requirements of the economy and new technologies, having managerial knowledge and promoting principles of sustainable development.

Improvements can be proposed on the environmental responsibility of the **Politehnica University of Timisoara**, because in the description found on the website there is no information about this pillar, but it places sustainability as a necessity and intends to find solutions to reduce the waste of resources from all the activities offered.

The **Technical University of Constructions of Bucharest** is focused on increasing the visibility of the university at the national and international level, as well as the training of new generations of construction specialists.

UTCB is in collaboration with the Romanian Geoexchange Society in the Pan-European Network of Centers of Excellence for Surface Geothermal Energy used in Civil and Historic Buildings.

It can be observed that the **Technical University of Cluj-Napoca** is focused on research directions related to the idea of remodeling the educational process to better respond to the real needs of the socio-economic environment.

It can be observed that the **“Gheorghe Asachi” Technical University of Iași** aims to stimulate critical thinking and creativity, offering equal opportunities to all members of society, to effectively respond to the demands of the economic environment. They also started a project with the title "Heat exchanger with uniform thermal flow integrated as a cold source in heating-air conditioning systems equipped with heat pumps", where they have in mind the realization of a heat exchanger with uniform thermal flow.

The limitations of this study refer to the information found on university websites which may be incomplete and thus those sustainability activities were not evaluated.

The future directions of this research refer to a semi-quantitative assessment of the capacity for sustainable development of the considered universities based on sustainability reporting indicators.

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Using Six Sigma to Improve the Quality Rate of a Display Production Line in the Automotive Industry

Rui Filipe DE CARVALHO¹, Sabina POTRA², Simon VELLS³

Abstract – The Six Sigma methodology has been developed to identify, measure, analyse, optimize, and control process variation. It provides companies with a mentality focused on continuous improvement and a common language for efficiency. Nevertheless, there are still few scientific papers which present the methodology in practical case studies. By using the DMAIC model and a set of well-known quality tools, the present paper aims to exhibit a successful implementation of the methodology in the automotive industry, more specifically on improving the quality rate of a display production line. Thus, it proves that small process improvements based on a solid methodology can drive competitiveness.

Keywords DMAIC model, Ishikawa diagram, SIPOC diagram, Capability analysis

I. INTRODUCTION

Six Sigma is a scientific methodology based on statistics [1], allowing companies to determine improvements on different kind of processes leading to major savings [2], not only in production but also in various fields such as finance [3], healthcare logistics [4], and others. But the most successful implementations remain in production, where the complexity of processes requires engineers to use specific quality tools and respect the DMAIC (Define Measure Analyse Improve Control) approach [5].

The automotive industry has developed extremely complex production processes of different parts in parallel for diverse clients. This situation determines chain reactions. If one process has high variability, the whole production may be jeopardized. Therefore, automotive companies require a proven methodology to control their processes and strive for competitive advantages. Six Sigma has been used in this industry to reduce nonconformities [6], scrap formation [7], or capacity waste in centreless grinding [8], but also for several improvements of industrial processes like the extrusion process in tire production [9], grinding processes [10], waste gate actuator [11], and so on. The achievements of using Six Sigma in automotive parts

production are reduction of tools expenses, cost of poor quality and labour expenses [12] with significant financial positive impact.

Therefore, Six Sigma with its DMAIC model will be used in this project to identify and reduce the weak spots of a screwing unit in an automotive company from the Western part of Romania.

II. IMPROVEMENT OF THE QUALITY RATE OF A DISPLAY PRODUCTION LINE

For the case study, we have chosen to analyse the manufacturing system of an automotive company situated in the Eastern part of Europe. More specifically, the scope of the present paper has been to apply the Six Sigma methodology to improve the final assembly line of their display. The screwing unit is represented by six key machines (WP7, 9, 10, 10.1, 11 & 12) and it is of high importance for the company because it affects the whole quality of the finished products.

The analysed production unit is mainly working with robots and consequently, the human interventions are reduced to the minimum. It is assembling the PCB (Process Control Board) to the displays with screws. To reach the best quality of the final product, the process must match predefined torque, angle criteria, etc. and must prevent dust and other particles to reach it during the operations.

For a Six Sigma approach to be successful, the selected project must firstly be a suitable DMAIC project and secondly, the different steps must be prioritized so that resources are allocated appropriately. A procedure that standardizes the selection of appropriate DMAIC projects uses a matrix of selection criteria. To select DMAIC projects, 15 criteria must be considered [13], according to which the project viability matrix is elaborated to determine which DMAIC approach is suitable to solve the problem. The viability matrix of the project is presented in Fig. 1.

¹ CESI Engineering School, Assat, France, ruifilipe.decarvalho@viacesi.fr

² Politehnica University of Timisoara, Romania, sabina.potra@upt.ro

³ CESI Engineering School, Assat, France, simon.vels@viacesi.fr

Criteria number	Description	Weight	No	Mostly No	Possibly	Mostly Yes	Yes
1	Are customers dissatisfied or defecting?	3					X
2	Is the process relatively stable?	3				X	
3	Is the specific defect known?	4			X		
4	Is data related to the defect available?	5				X	
5	Is the solution not?	3		X			
6	Are the expected benefits significant?	3			X		
7	Will service and/or quality improved?	2				X	
8	Does the project have champion and sponsor support?	4				X	
9	Is the project aligned with the company goals?	3				X	
10	Can the project be completed within 3 months?	2			X		
11	Is there a good probability of implementation considering the risk?	4				X	
12	Will the project involve low or no investment?	3		X			
13	Is the team available for the project?	2				X	
14	Is the ability to make change in the process largely in our control?	4			X		
15	Will the solution likely not involve the redesign of the process?	3	X				
Weighted scores			1	2	4.3	7.6	1
			TOTAL				3.7

Fig. 1. Project viability matrix

Next to each criterion there is a "weight" column, for establishing the importance of each criterion (the weight scale varies from "1 = least important" to "5 = most important"). After assigning a weight to each criterion, an answer must be given to each question about the project (between "1 = definite no" and "5 = definite yes"). To determine the scores of individual weights the Six Sigma team needs to divide each weight by 3, multiply each X-mark by its weight and summarize all X-mark values for each evaluation

column. To determine the total score, they must multiply each weighted score by the value of its evaluation and add these products, divide the sum of these products by the sum of the weighted scores. For the last step, the team evaluates the total score to establish the viability of the project. There are three different situations the project can find itself in: not viable (score < 2.0), a possible (score between 2 and 3) and a viable DMAIC project (score >3).

In the analysed case, the total score of the project is 3.7, which qualifies it as a viable DMAIC project. In the following, the five steps of the DMAIC method are underlined with their respective results.

A. Define

The Define phase (DMAIC) is the first step of the Six sigma improvement process and a critical one to the project success. It consists of the project description and lists encountered problems by a previously selected team. During the studied process, a PCB is fixed on a display with screwing robots. Process maps and a SIPOC (Supplier, Input, Process, Output, and Customer) diagram that can be seen in Table 1 are usually created to help the team to understand the process.

Aiming to define the whole steps of the process, a detailed flowchart of the assembly unit has been built (Fig. 2). To obtain the most accurate flowchart possible, the authors have been working with an automation engineer and translated the program into the different steps of the process. The screwing unit is composed of six automated stations where there is a lack of torque repeatability for the screwing process of the PCBs on the display's support and a lack of control of the distance between the screw head and the PCB. To understand the screwing process, a low-end flowchart has also been built for the specific step of the process and it can be seen in Fig. 3.

Table 1. The SIPOC diagram for the process

SUPPLIER	INPUT	PROCESS	OUTPUT	CUSTOMER
Company A	PCB; Camera	Final assembly line	Display ready	Final customer
Company B	Electronic components			
Company C	Display's Support & Screen		Production Reports	Management, Engineers & Interns
Company D	Screws			
Company E	Robots; Carriers			
Logistics department	Production Planning		Quality Department	

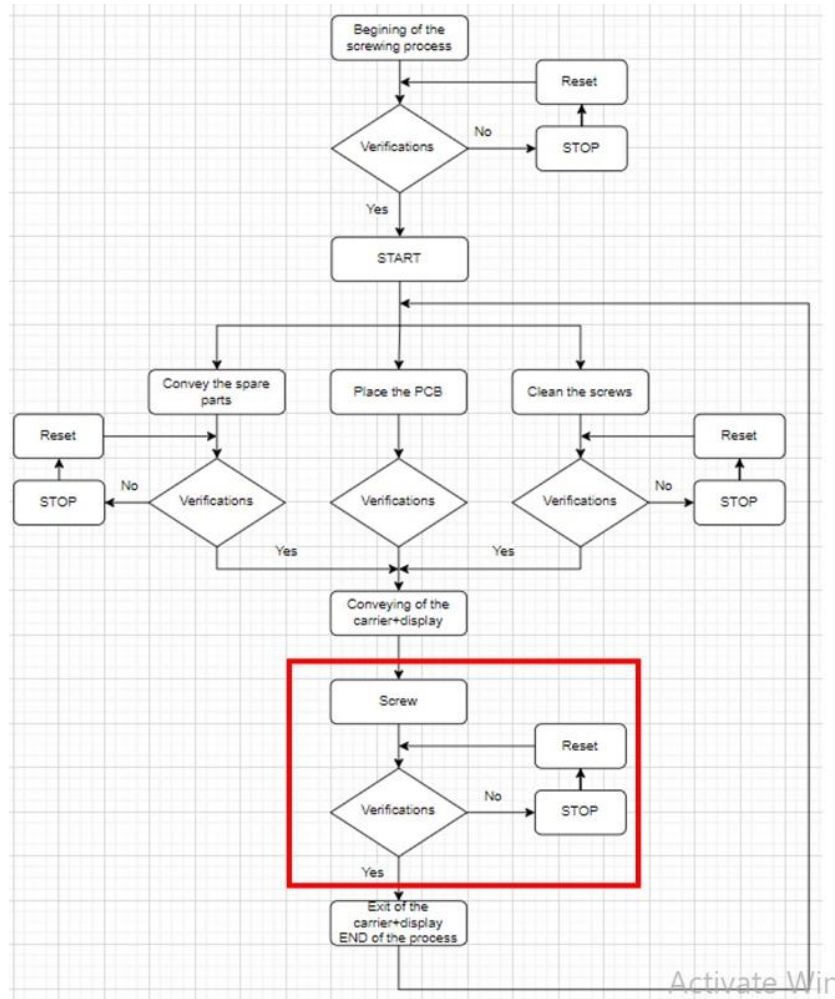


Fig. 2. High-end flowchart of the process

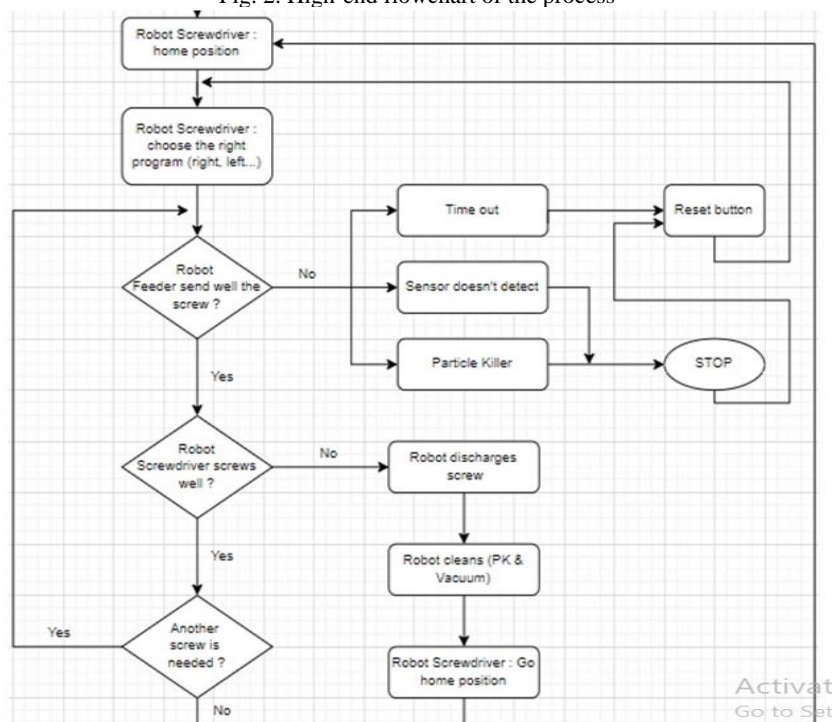


Fig. 3. Low-end flowchart of the screwing process

Table 2. Screwing problems encountered on each machine

Machine	Absence of PCB	Low Torque	Over torque	Screw angle
WP7	88	63	1	8
WP9	0	730	38	26
WP10	29	320	7	33
WP10.1	89	286	6	5
WP11	0	332	0	12
WP12	0	539	1	27
Total	206	2270	53	111

B. Measure

After the define stage of the project where the team has mapped the process and built a SIPOC diagram, in the measure stage it is necessary to collect data and therefore to improve the understanding of the failures that are occurring during the assembly process. The data extraction revealed different types of problems for the screwing process like wrong screw position, wrong PCB or display position, sensor defects as can be understood from Table 2.

A Pareto diagram has been created for more than 2650 defective parts and it is represented in Fig. 4. Pareto chart is sorting the problems by their frequency of occurrence. Thus, we can see which types of problems need to be addressed in the first instance to optimize the results.

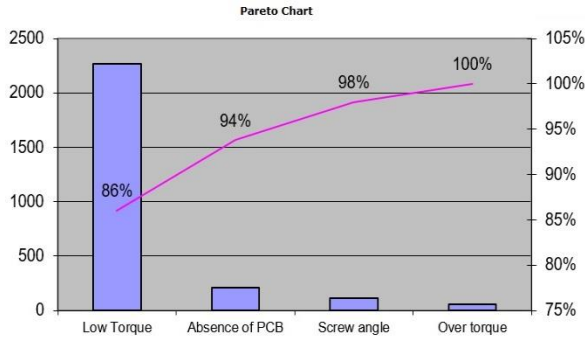


Fig. 4. Pareto chart of error types

The most representative defect the Six Sigma team has to focus upon was the screws' low torque problem.

Also, to statistically validate the problem, a capability analysis of the process has been realized for the machine WP9 that offered the most relevant data.

To calculate the C_p , we applied the formula (1):

$$C_p = (USL - LSL)/6\sigma \quad (1)$$

Because the C_{pk} coefficient considers possible decentering, the authors have also computed this coefficient by applying the formula (2):

$$C_{pk} = \min\left(\frac{USL - \mu}{3\sigma}; \frac{\mu - LSL}{3\sigma}\right) \quad (2)$$

In Table 3, the main results have been outlined.

Table 3. Screwing problems encountered on machine WP9

Column 1	Column 2
LSL	0.23
USL	0.27
Mean	0.2399251
σ	0.0469365
C_p	0.142036
C_{pk}	0.0704862
C_{pm}	0.1388727
Z	3
e	0.0014563

We can see that $C_p = 3\sigma$, $C_p = 2 C_{pk}$, $C_{pm} \approx C_p$. The dispersion of the measured torques for further information has also been detailed in Fig. 5.

The analysis reveals that the distribution is normal. Most of the defects are between 0 and 0.1 in the scatter plot.

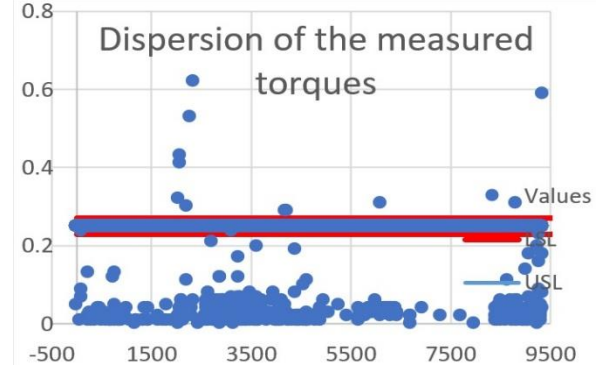


Fig. 5. Dispersion of the measured torques

This information is made clear by the capability analysis in Fig.6, where the defects are between 0 and 0.04 (which is circled in red on the graph) and shows that there is room for improvement.

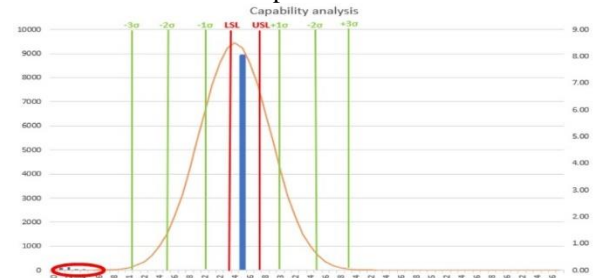


Fig. 6. The capability analysis of the screwing process in machine WP9

To improve the process, it is necessary to revise the torque to the middle of the tolerance interval and eliminate the outliers.

According to the data collected on machine WP9 (the machine that produces the most non-conforming products on the production line), and knowing that there are five criteria for non-compliance, we obtain a DPMO of 16,982.1 and a conformity rate of 98.30%. We know that this corresponds to a quality level of 3.6 sigma. This situation is not acceptable for the company whose goal is to reach Six sigma. This problem needs further analysis to determine the different root causes.

C. Analyze

The usual tools for the analysis phase of a DMAIC are the Ishikawa diagram, also known as the cause-and-

effect diagram, and the 5 Whys method. The Ishikawa diagram is a tool developed by Kaoru Ishikawa in 1962 and used in quality management. It is a graphical representation of the causes leading to an effect. It can be used as a tool for moderating a brainstorming session and as a tool for summarizing and communicating the causes identified. It is often used in the context of problem solving or risk identification and management.

We have drawn an Ishikawa diagram (Fig. 7) in which we can easily see that the most important causes that trigger the problem come from the "Machine" and from the "Material" branch. For a deeper understanding of the root causes in the screwing station determined by the cause-and-effect diagram, the 5 Whys method was used (Table 4).

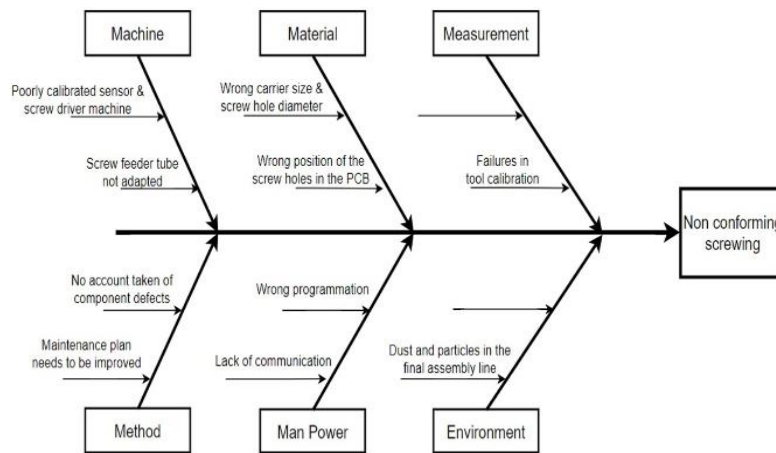


Fig. 7. The Ishikawa diagram for the nonconforming screwing process

Table 4. The 5 whys table for the three potential root causes of the nonconforming screwing process

Possible causes	Too low torque		Absence of PCB	Screw angle too high	
1 st why?	Wrong screw position	No screw in the screwdriver	Sensor does not detect the PCB	Screw turns in air	Screw breaks the support
2 nd why?	Incorrect X and Y position/Problem with the position of the display on the carrier	Screw stuck in the supply tube	Sensor is misadjusted	Wrong screw position	Support is weakened
3 rd why?	Absence of dynamic position correction/not the same display support on all carriers	Screw askew in the tube	Incorrect programming and maintenance need to be improved	Incorrect X and Y position	
4 th why?	Incorrect programming	Supply tube is too large		Absence of dynamic position correction	
5 th why?		Wrong conception		Incorrect programming	
Correct. actions	Improve the program/ensure a unique position on the carrier	Change the size of the supply tube	Improve the sensor programming and the maintenance plan	Improve the program	Not relevant for the company (too rare)

In Table 4, three main potential causes from the PARETO chart for the high number of rejects at the screwing station were analyzed. For the three main causes of the high number of rejects, we have a technical root cause, i.e., the incorrect programming of the machines and a material root cause, i.e., using a poka-yoke to ensure a unique position and change the screws supply tube for a smaller size.

Despite a fully automated assembly line, problems of non-conformity can occur if all the factors responsible for product conformity have not been studied in advance. Therefore, we will focus on a few corrective actions mentioned above in the improvement phase, to achieve the percentage of compliance expected by the company.

D. Improve

To find solutions to the reported problems, after several meetings and brainstorming with the team, the following actions were chosen and implemented:

- Putting the carriers in a unique position thanks to a poka-yoke, exchanging with the supplier to follow up this modification.
- Modify the program that runs the screwdriver to consider the positions of the screw holes.
- Adjust the position of each screw hole in the display, to reduce the process variation from one display to another.
- Change the diameter of the screw feed tube of the machine.
- Improve the PCB sensor program and increase the frequency of the sensor check.

E. Control

After the implementation of the actions defined in the improvement phase, the team considers as necessary to analyse the process again for control and continuous improvement (Table 5). For this reason, a new production was analysed.

Table 5. Capacity coefficients after improvement

Column 1	Column 2
LSL	0.23
USL	0.27
Mean	0.2489514
σ	0.0152434
Cp	0.437349
Cpk	0.4144198
Cpm	0.4363179
Z	4.3
e	0.0008601

Out of the 5808 products that the WP9 machine assembled, only 80 products were found to be non-conforming. Given that there are five non-conformity criteria, using the DPMO calculation method, we obtain a DPMO of 2,754.3 and a quality level of 99.72%, which corresponds to a 4.3 sigma level. This is an improvement on the 3.6 sigma achieved prior to the improvement project but is still below the 6-sigma

expected by the company. The continuous improvement implemented must be sustained over time to achieve the expected objectives.

III. DISCUSSIONS AND CONCLUSIONS

By applying the Six Sigma methodology, we can better understand the processes, identify the root causes of the problems, think about the most appropriate solutions, plan their implementation and follow-up to avoid errors and their consequences. The DMAIC way of working provides all the tools and logical steps necessary for process improvements and more informed decision making.

This scientific paper has verified the benefits of a DMAIC project in the automotive industry by going through the five phases of DMAIC and using well-known statistics and brainstorming tools.

The problem of the high number of rejects from the screwing station of the PCB-Display assembly line was analysed to determine whether it represents a viable DMAIC project.

After confirming the viability of the project, the process was mapped and an analysis of over 81,000 parts was carried out to determine the most common defect types. The data from the non-conforming parts was analysed to determine if the process was in statistical control and to visualize the process capability.

As the process had a Sigma level of less than 3.6, further analysis and improvement was required. After an Ishikawa diagram and a 5-Why table, a technical and material root cause was identified.

In the improvement phase, five corrective and preventive actions at the screwing station were proposed. In the control phase, the process capacity was continuously monitored. The Sigma level was 4.3 with a quality rate of over 99.72%, which is an excellent result for most of the companies.

But, even if a quality level of over 99.72% has been achieved, for an automotive company that produces hundreds of thousands of parts per year, non-conformities result in additional costs that could be avoided. For this reason, it is necessary to continue to work with a view to continuous improvement of the process. Continuous monitoring of quality indicators of the process, weekly meetings to decide, solve problems in production, all this is what it needs to reach the Six sigma quality level.

Decision-making was based on rigorous statistical measurement and analysis, which resulted in a high level of performance.

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Ergonomics and Human Factors in the Cyber Age. The Case of Ergonomics and Human Factors Regional Educational CEEPUS Network

Anca DRAGHICI¹, Gyula SZABO², Brigita GAJSEK³, Beata MRUGALSKA⁴,
Tihomir DOVRAMADJIEV⁵, Aleksandar ZUNJIC⁶

Abstract – The Ergonomics and Human Factors Regional Educational CEEPUS Network (CIII-HU-1506-01-2021) was established and approved for funding in 2020 and still planned to be extended and developed. The network is the result of collaboration between nine universities with a key role in ergonomic education and research, promoting the profession of ergonomist (especially in industrial and logistics systems fields). Partners have agreed on providing support for master and doctoral programs, for joint scientific and didactic publications, at the level of European requirements and standards, but with a focus especially in the Danube region. The paper aims to present the achievements of the Ergonomics and Human Factors Regional Educational CEEPUS Network during the last two academic years (2020 – 2022) and the planned activities for the next period (2022 – 2023). The Network establishment and development is considered mature and could be a good practice example in the field of ergonomics collaborations by providing evidence of common activities and achievements that have conducted to the extension of the network and other project collaboration types of development.

Keywords Central European Exchange Program for University Studies (CEEPUS), network, ergonomics, human factors, collaborative work, mobility, education.

I. INTRODUCTION

“Central European Exchange Program for University Studies (CEEPUS) is the short form for Central European Exchange Program for University Studies and is a multilateral University exchange program in the extended Danube region based on an international Agreement. There are sixteen members

states who joint the current CEEPUS III agreement (Done at Budva, Montenegro, on March 25, 2010) now, each member state has a National CEEPUS Office” (CEEPUS, 2022).

The Central European Exchange Program for University Studies (CEEPUS) is a multilateral University exchange program in the EU Danube Region. It started with the agreement signed in 1995, being extended to 16 countries with active National CEEPUS Offices, in the present. As a prove of the intense activities developed, in the 2019 - 2020 academic year there were valid for mobilities 106 CEEPUS networks and later, in 2021-2022 more than 150 networks were active (CEEPUS, 2022).

Actually, “to the general objective to promote cooperation in the framework of the EU Strategy for the Danube Region (EUSDR), the CEEPUS III focus on joint PhD programs. Network activities on one hand range from semester long or short-term teacher and student mobility on Bachelor, Master and PhD level, short term excursions, intensive courses, and on the other hand consist of joint research, event organization and educational program development” (Szabo et al., 2021).

In this context, the paper aims to present the achievements of the Ergonomics and Human Factors Regional Educational CEEPUS Network (CIII-HU-1506-01-2021) during the last two academic years (2020 – 2022) and the planned activities for the next period (2022 – 2023). The Network establishment and development is considered mature and could be a good practice example in the field of ergonomics

¹ Politehnica University of Timisoara, Faculty of Management in Production and Transportation, Timisoara, Romania, anca.draghici@upt.ro

² Óbuda University Donát, Bánki Faculty of Mechanical and Safety Engineering, Budapest, Hungary, szabo.gyula@bkg.uni-obuda.hu

³ University of Maribor, Faculty of Logistics, Celje, Slovenia, brigita.gajsek@um.si

⁴ Poznan University of Technology, Faculty of Engineering Management, Poznan, Poland, beata.mrugalska@put.poznan.pl

⁵ Technical University of Varna, Faculty of Shipbuilding, Varna, Bulgaria, tihomir.dovramadjiev@gmail.com

⁶ University of Belgrade, Faculty of Mechanical Engineering, Beograd, Serbia, azunjic@mas.bg.ac.rs

collaborations by providing evidence of common activities and achievements that have conducted to the extension of the network and other project collaboration types of development. From the presentation there will be characterised partners involvement and activities in the CEEPUS Network. The CEEPUS Network (CIII-HU-1506-01-2021) evolution is presented in accordance with the paper's sections: (1) introduction; (2) description of the CEEPUS Network; (3) implemented and planned activities; (4) operational actions and partners contributions; (5) conclusions and final remarks.

II. DESCRIPTION OF THE CEEPUS NETWORK

The Ergonomics and Human Factors Regional Educational CEEPUS Network provides leading-edge competency in the human-oriented product, process, and organizational innovation (EHFRE, 2021). The aim of the network is to facilitate, encourage and support education, research, and professions in the field of ergonomics and the human factor, mainly through mobility, guidance, and joint support of doctoral programs (in accordance with existing legislation, rules, and regulations in each partner university), and in the long term it is aimed at creating a common doctoral training in the field (Szabo et al., 2021).

Partners in the network collaborate to create a formal academic structure for student exchange on bachelor, master, and doctoral levels, participate in each other's master and postgraduate programs and develop shared training contents, university courses, and joint doctoral programs in the long term. In addition, partners work together in various international ergonomics organizations (e.g., International Ergonomics Association and the Federation of European Ergonomics Societies) and report their research results to different international events and publications, thus increasing their work and collaboration visibility.



Fig. 1. The geographical spread of partners in the CEEPUS Network.

Furthermore, universities and related faculties partners also represent their national assessment boards at the Centre of Registration of European Ergonomists. The participating units have the usual shared activities like a regular CEEPUS network, as the Erasmus+ student (PhD) and teacher mobility, professional workshops, summer universities, research, and educational projects, and successful international doctorandus workshops.

The participating institutions in the network system have different educational profiles, but complementary; however, they share the fact that ergonomics is a priority in their education program, and they perform high-quality ergonomic research and education programs, and they employ prominent ergonomists. The composition of the network provides the institutional diversity needed to develop a program in this multi-disciplinary scientific domain. It is also common in the participating institutions that they are devoted to starting an ergonomics/human factors training based on the standard criteria of ergonomics, and they consider the Danube Region cooperation as a critical success factor. Our network started at the most challenging time, the epidemic's beginning. In the 2021/2022 academic year, we improved our mobility performance; however, despite continuous rescheduling, virtual mobilities and postponed mobility completion in October 2022, we could not meet the mobility goals. In addition to the regular operation of CEEPUS, we had to carry out continuous problem-solving, which shifted the priority from personal mobility to other network activities.

Although everyone has yet to meet everyone in person, our mobilities, the in-person network meeting in Varna, August 2021 and the personal meetings realized with CEEPUS and other funding contributed significantly to the operation of the network. Thanks to the three ERASMUS+ KA220-HED - Cooperation partnerships in higher education projects, we won enabled us to work together on focused collaboration every day. The CEEPUS and ERASMUS mobilities give us a solid foundation to operate the network. We believe the CEEPUS network is the origin of our collaborative success, and we want to use it to create even more possibilities. The network supports the national ergonomic associations. For example, the Romanian Ergonomic Association ErgoWork (Prof. Anca DRAGHICI, president) has recognized and rewarded Prof. Gyula SZABO and Prof. Aleksandar ZUNJIC as main promoters who contributed to the development of the ErgoWork association and the scientific event. In addition to the epidemic situation, it is difficult to mobilize students and staff for mobility due to a general lack of interest. CEEPUS mobilities are not economically attractive, as those who might want to travel can benefit more from, for example, Erasmus plus mobilities. Funding does not cover the costs of mobilities, so these trips would require additional resources and are only occasionally guaranteed. This year, we experienced that the success of mobility strongly depends on the attitude of the

national offices of each country. NCOs are very flexible and supportive occasionally.

The composition of the network will undergo a slight change in the next period. We extended the network in Bosnia-Herzegovina, with the implication of the Faculty of Mechanical Engineering of the University of Mostar. In addition, the Faculty of Manufacturing Technologies (located in Presov) of the

Technical University in Kosice, replace Constantine, the Philosopher University in Nitra from Slovakia. IMC University of Applied Sciences Krems continues to participate in our work as a network member rather than as a partner applicant. Details of the entities higher education units involved in the network are given in Table 1.

Table 1. The CEEPUS Network partners (for the 2023 – 2024 academic year)

Partner	Role	Description
<p>Óbuda University, Budapest, Hungary</p> <p>Donát Bánki Faculty of Mechanical and Safety Engineering</p>	Coordinator	<p>The faculty participates in several CEEPUS networks in mechanical engineering and mechatronics, and they intend to create similar mobility opportunities for their safety technology engineering students and teachers as well.</p> <p>The major education field is on security engineering since the faculty staff support a bachelor and a master programme degree in this field and the existing doctoral school has been established in the field of safety science too. In the field of safety science, the faculty is actively involved in domestic professional life playing a vital role in the adaptation of international knowledge and practice, and actively participate in worldwide professional cooperation. The Ergonomics and Human Factors Regional Educational CEEPUS Network will extend our potential to fulfil our domestic role.</p> <p>Primary safety and security research topics in the faculty: IT safety and security organisational culture and behavioural safety human reliability; security technology; biometric identification; critical infrastructure protection; occupational safety and health; fire protection and industrial safety.</p>
IMC University of Applied Sciences Krems, Austria	Tender partner (Active partner for the 2022-2023 academic year)	<p>The university is a limited liability company. The shareholders consist of IMC Consulting GmbH (70%) and the city of Krems (30%). The university has many years of experience in business, health science and life science due to its activities in this sector. More than 3,000 students (approx. 70% women, 30% men) are currently enrolled in 32 full-time or part-time bachelor and master programmes in the fields of business, digitalisation and engineering, health sciences, and life sciences (50 % of the study programmes are offered in English). Due to the international orientation, the percentage of international students is 12%.</p> <p>The following research areas offer linkages to the CEEPUS Network and will be open for contribution: new world of work, Scan to VR, Train@train, consumer studies and innovation management, digital transformation and organisational development, tourism marketing and technology.</p>
<p>Technical University of Varna, Bulgaria</p> <p>Faculty of Shipbuilding</p>	Partner	<p>The strategy of TU-Varna in scientific research aims to establish the institution as an innovation and technology center. The following activities are realized:</p> <ul style="list-style-type: none"> • Stable connections with leading companies; • Creation of specialized laboratories; • Organization of business-incubators and High-Tech centers; • Creation of virtual labs at the university. <p>TU-Varna has been certificated for ISO 9001 quality management. It is a leading research center in “Advanced technologies in design, Software Technologies”, Internet and web-applications, “Smart technologies in telecommunications and computer networks”, “Samsung Innovation Lab”, “Mikrotik Lab” having high performance infrastructure and equipment in CAD-CAM, applied technologies in healthcare, Naval architecture and marine technology. TU-Varna collaborates closely with Municipality of Varna in projects dedicated to ‘science in the society’ and citizenship.</p> <p>They will seek to support internationalization through active dialogue with CEEPUS partners, exchange of information and promotion of ergonomic activities. TU-Varna will actively participate in the cultural exchange with partner countries through exchange at contact level.</p> <p>The mobility of teachers, doctoral students and students will be adjusted to the setting of specific goals and objectives to optimize the use of contacts, exchange of experience, knowledge and specific joint initiatives into ergonomics and science related fields. TU-Varna will strive to deepen the professional relations with the partners by creating opportunities for realization of joint international projects and programs. TU-Varna, together with the university partners, will support in the preparation of double diploma degree programs.</p> <p>The Bulgarian Ergonomics Society has been established in 2019 (by a group of teaching and research staff of TU-Varna) and is a member of the Federation of European Ergonomics Societies (FEES).</p>

<p>University of Zagreb, Croatia</p> <p>Faculty of Mechanical Engineering and Naval Architecture</p>	<p>Partner</p>	<p>The University of Zagreb (established 1669) is the oldest and biggest university in the Republic of Croatia. The Faculty of Mechanical Engineering and Naval Architecture is the oldest and the largest mechanical engineering school in the Republic of Croatia. The Faculty offers undergraduate, graduate and postgraduate programmes in three courses of study: mechanical engineering, naval architecture, aerospace engineering, and undergraduate and graduate programmes in mechatronics and robotics. Specializations and sub specializations in the mechanical engineering course are: Design (Medical Design, Product Design and Development, Mechanisms and Robots, IC Engines and Motor Vehicles); Process and Energy Engineering (Thermal Engineering, Process Engineering and Energy Engineering); Production Engineering (Production Automation, Machining Systems, Quality Assurance, Manufacture and Assembly, Welded Structures); Industrial Engineering and Management; Marine Engineering; Engineering Modelling and Computer Simulation; Computer Engineering (Intelligent Assembly Systems, Polymer Product Manufacture, Computer Modelling of Tools and Dies, Computer-Based System Management, Computer Integrated Product Development, Modern Machining Systems and Processes, Quality Management, Foundry) and Materials Engineering. To promote ergonomics, the Croatian Ergonomics Society was established in 1974 at the Faculty of Mechanical Engineering and Naval Architecture. The Society is a member of the Federation of European Ergonomics Societies (FEES) and International Ergonomics Association (IEA). Research topics in the field of ergonomics and human factors at the faculty are: biomechanics in ergonomics (determination and analyses of load on the human); development of assessment procedures; ergonomics in product and engineering design; improvement of human-machine-environment design; ergonomics in logistics (ergonomics in order-picking process). The PhD education is interested in: the development of the new shared training contents and courses; the development of PhD workshops; the co-supervision of PhD thesis; the participation in doctoral committees.</p>
<p>Poznan University of Technology, Poland</p> <p>Faculty of Engineering Management</p>	<p>Partner</p>	<p>The University offers lectures in English PhD School in English: cooperates with more than 100 universities all over the world; offers double diplomas; a member of Conference of European Schools for Advanced Engineering Education and Research, an organisation that brings together the best technical schools, a member of the Societe Europeenne pour la Formation des Ingenieurs, of the European University Association, of ADUEM (Alliance of Universities for Democracy) and the International Association of Universities.</p> <p>The Polish Ergonomics Society was established in 1977 and since then we managed to create its 14 sub-divisions located in the whole country. We belong to the Federation of European Ergonomics Societies (FEES) and International Ergonomics Association (IEA). In our country the National Assessment Board of European Ergonomists was established, and we are a member of the Centre for Registration of European Ergonomists. The Centre for Registration of European Ergonomists (CREE) confers the professional title "European Ergonomist" to designate qualified and experienced members of the profession. The quality of their professional practice and their education must be peer-reviewed, and they must adhere to a professional Code of Conduct. CREE certified people may use the letters Eur.Erg after their name.</p> <p>The role of the organization in the network: teach students and professors in ergonomics and human factor in theory and practice; will be responsible for the exchange students (B.Sc., M.Sc. and Ph.D.), exchange professors for teaching students and training in workshops; will be responsible for sharing laboratories with incoming students for working on Bachelor, M.Sc. or Ph.D. thesis; will be responsible for collaborating on comparative analysis of curriculums between CEEPUS network universities; will contribute in preparing teaching materials and their adoption in the redesign courses; will prepare with the partners a teaching book about ergonomics and human factor for students; will invite partners to prepare together papers for journals; will establish an exchange program between PUT and other partners to provide an attraction to students, bilateral knowledge transfer and industrial related student projects focused on new technologies</p>
<p>Politehnica University of Timisoara, Romania</p> <p>Faculty of Management in Production and Transportation</p>	<p>Partner</p>	<p>Politehnica University of Timisoara (UPT) is the biggest technical universities from the West part of Romania. The research and education in the field of Ergonomics and Human Factors are supported by 3 faculties: Faculty of Management in Production and Transportation (industrial ergonomics field, workplace management and occupational health and safety - bachelor, master and PhD. programmes), Faculty of Architecture and City Planning (ergo-design filed for different types of spaces - Bachelor level) and the Faculty of Mechanical Engineering (industrial ergonomics field, robotics - bachelor, master and PhD. programmes).</p>

		<p>In 2019, an initiative group from the Management Faculty has established the Romanian Society of Ergonomics and Workplace Management (ErgoWork) considering the maturity level reached in education and research in the local area and which is member of the Federation of European Ergonomics Societies (FEES). The same initiative group has carried out the successful national project for defining the qualification standard and for registering the profession of Ergonomist (code 226309) in the National Qualifications Register (level of studies - 4, higher studies). The common activities are meant to strengthen the ongoing collaboration in the field of Ergonomics and Human Factors to enrich:</p> <ul style="list-style-type: none"> • Education area: improve the curricula structure and context for the Bachelor and Master levels; to invite partners staff to present relevant and actual topics for the bachelor, master, and PhD students; to develop shared training contents, university courses; • Research area: to identify and develop common researches in specific topics (co-supervision of thesis as joint doctoral programs in the long term); to create a formal academic structure for student exchange on bachelor, master, and doctoral level (to develop a part of their research related to their thesis at one or more partner's organization/research laboratory); to invite experts from partners in the PhD. public defense (as reviewer deliver a report); to collaborate in develop and publish common articles to disseminate our common results (for conference proceedings and/or journals); to support the national conference (as invited participants to ErgoWork conference organized in Timisoara, Romania).
<p>University of Belgrade, Serbia</p> <p>Faculty of Mechanical Engineering</p>	Partner	<p>At the University of Belgrade, Faculty of Mechanical Engineering (UB-FME) European exchanges take place under the established Tempus and Socrates Programmes of the European Commission. As the Faculty fully implements the European Credit Transfer System (ECTS), qualifications gained at the Faculty of Mechanical Engineering are easily recognized and understood in other European countries, and vice versa.</p> <p>The Faculty can achieve multiple benefits, through: the opportunity for students to hear lectures on ergonomic topics that interest them, by the side of the international experts in this scientific area; possibility to exchange knowledge and experience between international ergonomics experts, related to the education of students in the area of ergonomics; possibility of participation of foreign international experts in mentoring work with PhD students; possibility of participation of foreign international experts in the commissions for the evaluation and defense of doctoral dissertations; possibility to use the laboratory facilities of the greater number of foreign laboratories; possibility of teamwork of students from different universities in finding new solutions of modern scientific and professional problems; possibility of realization of practical work of students (internships) abroad; improvement of the foreign language through the use of professional terms; the possibility of creating ergonomic study programs that will be common to a number of universities (colleges) in the countries participating in this project; creating a basis for ongoing cooperation of the entities participating in this project, which will result in continuous improvement of education in these countries especially in the field of ergonomics, as well as in the formation of quality experts who, upon completion of their studies will contribute to the development of economies in the countries where they work. Courses of ergonomics at the UB-FME are: Industrial ergonomics (BSc); Ergonomic designing (MSc); Man - machine system design (MSc); Man - machine interface (Ph.D.).</p>
<p>University of Maribor, Slovenia</p> <p>Faculty of Logistics (in Celje)</p>	Partner	<p>Slovenia is one of the few non-FEES (the Federation of European Ergonomics Societies) and non-IAE (International Ergonomics Association) countries with no trained ergonomists. Thus, the participation in the Network is of great importance in developing an educational program, transferring good practices and for common research activities.</p> <p>The Faculty could support the following activities: extend/spred ergonomics and develop teachers' competences in Slovenian existing education programs; measure and investigate the impact of the applied technology on health and productivity in manual working systems; study towards balanced productivity and ergonomics in the pursuit of lean intralogistics and production; improve the approaches of workplace design in the Industry 4.0 Era from productivity and ergonomics perspective.</p>
<p>Constantine, the Philosopher University in Nitra, Slovakia</p>	Partner (for the academic years 2021 – 2022 and 2022 - 2023)	<p>The Faculty of Natural Sciences at Constantine the Philosopher University in Nitra has accredited study programs on all three levels of study: bachelor, master, and PhD programmes. The main task of the Faculty is to provide university education and creative scientific research in the sphere of natural sciences, maths, and informatics. In the frame of Department of Informatics CPU in Nitra realizes education in bachelor's and master's grades in the following study programmes: Applied informatics and teaching academic subjects. The workplace disposes of up-to-date</p>

		<p>schoolrooms to provide sufficient hardware background for the realization of curricula. An ambition of the Department of Informatics is to offer to its student's wide-spectrum knowledge so that the graduate was able to find his/her place in the practice in the shortest possible time after the graduation. At the same time students have chances to acquire practical experience during the study by means of professional practice, which is planned both in master's and bachelor's studies. Department of Informatics has a fruitful and rich experience in cooperation with many companies, the research being divided into three directions:</p> <ol style="list-style-type: none"> 1. Knowledge Discovery and Data Analysis Research Group: Web mining, especially data preparation techniques and modelling of information systems stakeholders' behaviour depending on time, Text mining and natural language processing is focused on data pre-processing techniques in natural language processing research field, especially in the automated evaluation of machine translation, Learning analytics and educational data mining, modelling the VLE stakeholders' behaviour, content analysis, learning analytics architecture, self-regulated learning approach. 2. Modelling and Simulation in Specific Environments Research Group. This research field is focused on modelling and simulation of natural processes with emphasis on qualitative and quantitative analysis of static and dynamic systems and processes, design and development of new algorithms for solving the complex problem using neural networks, modelling parallel processes in operational systems, networks and educational processes using Petri nets. Internet of Things (IoT) – research in the field of sensors network, design and modeling of a sensory network using various modeling tools; the need to address the following challenges: communication, time synchronization, localization, durability: energy intensity, reliability and security; hardware and software implementation of the sensory network; analysis and evaluation of output data from sensor networks; implementing artificial intelligence in IoT environments (e.g., Fuzzy logic, neural networks, optimization approaches such as evolutionary algorithms, etc.); optimization tasks to reduce the energy consumption of the sensor network in the context of IoT. 3D printing is the next-generation engineering technology that is shaping designing and manufacturing fields for a better tomorrow. It is an efficient tool for engineers, designers, hobbyists, and researchers to give a distinct shape to their ideas. In the field of education of students, we introduce new technologies in the form of spatial 3D modelling and then we use the 3D printing to motivate students to better understand the issue. We use 3D printing in various subjects such as Cybernetics and Robotic systems. The contribution of the team is the erudition of the issue and the possibility of creating e-courses in the field of 3D modelling and 3D printing. We work with professional practice in the field of 3D printing like a Start-up company Pro Tec s.r.o. 3. Theory of Computer Science Education Research Group optimization of computer science education at primary and secondary schools with emphasis on learning programming languages, web-based education, adaptive and personalized learning. <p>The involvement in the CEEPUS Network is a great opportunity for extended the education and research activities with the ergonomics and human factors knowledge, approaches and perspective on man – machine - environment systems. The collaborations and mobilities in the CEEPUS Network should contributed to the teaching and research staff competence development.</p>
<p>Technical University in Kosice, Slovakia</p> <p>Faculty of Manufacturing Technologies (in Presov)</p>	<p>Partner (new partner)</p>	<p>Technical University in Košice is a public institution that provides education in the technical, economic, and artistic fields in all three levels of higher education, for domestic and foreign students. It was founded in 1952. Currently, the Technical University in Košice has 9 faculties. Each faculty offers accredited study programs for the bachelor, master and doctoral degrees of higher education. The faculty has 8 accredited study programs at the bachelor's level (1 Production management; 2 Monitoring and diagnostics of technical equipment; 3 Renewable energy sources; 4 Computer support of production technologies; 5 Industrial management; 6 Progressive technologies; 7 Smart technologies in industry; 8 Technologies of automobile production) and 8 accredited study programs in the master engineering degree (1 Intelligent technologies in industry; 2 Production management; 3 Monitoring and diagnostics of technical equipment; 4 Renewable energy sources; 5 Computer support of production technologies; 6 Industrial management; 7 Progressive technologies; 8 Technologies of automobile production), as well as 5 accredited study programs in the doctoral degree (1 Production technologies; 2</p>

		Computer support of production technologies; 3 Technical systems design; 4 Management of industrial production; 5 Process technology). The involvement in the CEEPUS Network is a great opportunity for education and research activities because Ergonomics and Human Factors knowledge are weak represented in education topics and research.
University of Mostar, Bosnia-Herzegovina Faculty of Mechanical Engineering in Presovo	Partner (new partner)	University of Mostar in numbers today: ten faculties, one academy, one hundred and forty study programmes, a thousand teachers and twelve thousand students. Today Faculty of Mechanical Engineering offers undergraduate, graduate and postgraduate programmes in three courses of study: mechanical engineering, computing and electrical engineering (having implemented the ECTS system). At this moment, there is no formal education in the field of “ergonomics” or “human factors” within the undergraduate, graduate and doctoral studies at higher education institutions in Bosnia and Herzegovina. There are courses in the field of “ergonomics” or “human factors” that are taught at undergraduate, graduate and doctoral curricula at our Faculty. The objectives of the CEEPUS Network involvement are improvement of the curricula structures, development of training courses, conducting lectures in English, improvement of the student’s skills, support for professors in the field of ergonomics and strengthen the collaboration in the field of Ergonomics and Human Factors. The advantages of networking are availability of other universities research infrastructure, exchange of international knowledge in the field of Ergonomics and Human Factors and sharing and adoption a good practice through personal contact. The proposed networking will strengthen the collaboration to enrich the research and education in the field of Ergonomics and Human Factors.

III. IMPLEMENTED AND PLANNED ACTIVITIES

3.1. Activities in academic year 2020 - 2021

The network completed some mobilities before the academic year's official launch, however with countries locked down this option went out. At the time of the new network application, we just hope that we

can complete the CEEPUS founded mobilities in the remaining period of the year. Starting up a mobility network in the COVID-19 pandemic time is an extraordinary challenge. The secret of the survival of the Ergonomics and Human Factors Regional Educational CEEPUS Network is that this network is devoted to work together regardless of the circumstances. In Table 2 are centralized all the CEEPUS Network activities and their related outcomes with partners involvement.

Table 2. Activities in the CEEPUS Network in the 2020 - 2021 academic year

Partners involved	Type of activity, details description and outcomes
Conferences and workshops	
University of Timisoara, Romania (organizer) with participants from Hungary, Austria, Poland, Bulgaria	ErgoWork 2020 International Conference (18-20 June 2020), http://www.mpt.upt.ro/cercetare/conferinte/ergowork.html Publications: ▪ 34 papers published in Acta Technica Napocensis - Series: Applied Mathematics, Mechanics, and Engineering (Clarivate Analytics – Emerging Sources Citation Index – Indexed), vol. 64, Special Issue 1 (2021), https://atnamam.utcluj.ro/index.php/Acta ▪ 9 selected papers published in Human Systems Management journal (Clarivate Analytics – Emerging Sources Citation Index), https://www.iospress.nl/journal/human-systems-management/ , special issue: Draghici A. (Ed.), “Changes and challenges of human systems management during and after the pandemic”, vol. 39, no. 4.
Obuda University, Hungary with participants from Romania	1 st PhD and master student on-line workshop series (14 October 2020)
University of Maribor, Slovenia with participants from Romania	Logistics Summer Schools: “Designing future workplaces: Endless possibilities”, Celje, Slovenia (20-25 Sept. 2020)
Obuda University, Hungary with ALL partners involvement	Sessions of online training lessons on Ergonomics and Human Factors, together with: • Informative session for sharing the news from FEES (https://www.ergonomics-fees.eu/) and IEA (https://iea.cc/) • Promote the network (activities, opportunities and collaboration results) during the specific training or teaching classes with Bachelor and Master students
Obuda University, Hungary with participants from Austria, Romania, Poland, Bulgaria	“Ergonomics Redefined - Summer University on Ergonomics 34 th ” (7-9 July 2021), online with tracks in partners national languages, Ergonomics Redefined – Magyar Ergonómiai Társaság (ergonomiavilaga.hu)

Special Issues in prestigious journals	
Prof. Larisa IVASCU, PhD., Politehnica University of Timisoara, Romania	"Ergonomics and Sustainability" in Safety journal (Clarivate Analytics – Emerging Sources Citation Index), (4 papers accepted)
Prof. Dr. Beata MRUGALSKA, Poznan University of Technology, Poland	Special Issue "Human Factor in Lean Production" in Sustainability journal (Clarivate Analytics Indexed, IF = 2.576), (6 papers accepted to be published including debate on ergonomics in lean manufacturing)
Prof. Anca DRAGHICI, PhD., Politehnica University of Timisoara, Romania, and Prof. Nicoleta CARUTASU, University Politehnica of Bucharest, Romania	Special Issue "Synergies between Ergonomics and Sustainability for Work-Place Wellbeing—Solutions for Efficient and Effective Occupational Risk Management" in Sustainability journal (Clarivate Analytics Indexed, IF = 2.576) – launched in January 2021 - deadline 31 Nov 2021
Publications (articles, book chapters etc.)	
<p>[1] Zunjic A. (2020). The role of ergonomics in preventing the spread of the COVID-19 virus. <i>IETI Transaction on Ergonomics and Safety Journal</i>, 4(1), 1-4</p> <p>[2] Zunjic A. (2020). The influence of preventive maintenance of the city water supply network on the safe performance of citizens work activities in the conditions of the COVID-19 virus pandemic - case study. <i>IETI Transaction on Ergonomics and Safety Journal</i>, 4(1), 5-8.</p> <p>[3] Mohora I., Soim H., Capotescu S. (2020). Generations at work in the post-pandemic time. <i>IETI Transaction on Ergonomics and Safety Journal</i>, 4(1), 14-31.</p> <p>[4] Zunjic A., Stojkovic D., Cicevici S., Trifunovic A., Yue X. G. (2020). Influence of Covid-19 Virus on Stress Level in Population Groups With Different Status and Characteristics of Employment, <i>IETI Transaction on Ergonomics and Safety Journal</i>, 4(1), 32-38.</p> <p>[5] Neag, P. N., Ivascu, L., Mocan, A., & Draghici, A. (2020). Ergonomic intervention combined with an occupational and organizational psychology and sociology perspectives in production systems. In <i>MATEC Web of Conferences</i> (Vol. 305, p. 00031). EDP Sciences.</p> <p>[6] Draghici, A. (2020). Changes and challenges of human systems management during and after the pandemic. <i>Human Systems Management</i>, 39(4), 469-72 - Editorial to a Special Issue</p> <p>[7] Dufour, C., Draghici, A., Ivascu, L., & Sarfraz, M. (2020). Occupational health and safety division of responsibility: A conceptual model for the implementation of the OHSAS 18001: 2007 standard. <i>Human Systems Management</i>, 39(4), 1-41.</p> <p>[8] Mocan, A., & Draghici, A. (2020). A Proposed Ergonomics Maturity Level Framework and Assessment Tool. In <i>Innovation in Sustainable Management and Entrepreneurship: 2019 International Symposium in Management (SIM2019)</i> (p. 357). Springer Nature.</p> <p>[9] Neag, P. N., Ivascu, L., & Draghici, A. (2020). A debate on issues regarding the new ISO 45001: 2018 standard adoption. In <i>MATEC Web of Conferences</i> (Vol. 305, p. 00002). EDP Sciences.</p> <p>[10] Neag, P. N., Gaureanu, A., & Draghici, A. (2020). Characterizing Safety Leadership Based on the Seven Skills of Effective People Model. <i>Management (18544223)</i>, 15(3).</p> <p>[11] Bere-Semeredi I., Draghici A., Fistic G. (2020). Exploring the Training Needs for Climate Change and Sustainable Energy Consumption in the Case of Public Local Authorities. <i>Management (18544223)</i>, 15(2).</p> <p>[12] Boatca, M. E., Draghici, A., & Gaureanu, A. (2021). Home ergonomics—lessons learned. In <i>MATEC Web of Conferences</i> (Vol. 343, p. 11012). EDP Sciences.</p> <p>[13] Gajšek, B., Dukić, G., Butlewski, M., Opetuk, T., Cajner, H., & Kač, S. M. (2020). The impact of the applied technology on health and productivity in manual “picker-to-part” systems. <i>Work</i>, 65(3), 525-536.</p> <p>[14] Gajšek, B., Šinko, S., Kramberger, T., Butlewski, M., Özceylan, E., & Đukić, G. (2021). Towards Productive and Ergonomic Order Picking: Multi-Objective Modeling Approach. <i>Applied Sciences</i>, 11(9), 4179.</p> <p>[15] Gajšek, B., Dukic, G., Kovacic, M., & Brezocnik, M. (2021). A multi-objective genetic algorithms approach for modelling of order picking. <i>International Journal of Simulation Modelling</i>, 20(4), 719-729.</p> <p>[16] Gajšek, B., Stradovnik, S., & Hace, A. (2020). Sustainable Move towards Flexible, Robotic, Human-Involving Workplace. <i>Sustainability</i>, 12(16), 6590.</p> <p>[17] Dukić, G., Opetuk, T., & Gajšek, B. (2021). Space, Time and Ergonomic Assessment of Order Picking Using Horizontal Carousel. In <i>Proceedings of the 8th International Ergonomics Conference: ERGONOMICS 2020</i> (pp. 73-83). Springer International Publishing.</p> <p>[18] Mrugalska, B. (2020). Lean and ergonomics competencies: knowledge and applications. In <i>Human Systems Engineering and Design II: Proceedings of the 2nd International Conference on Human Systems Engineering and Design (IHSED2019): Future Trends and Applications, September 16-18, 2019, Universität der Bundeswehr München, Munich, Germany</i> (pp. 654-660). Springer International Publishing.</p> <p>[19] Ávila, S., Mrugalska, B., Wyrwicka, M. K., Souza, M., Ávila, J., Cayres, É., & Ávila, J. (2020). Cognitive and organizational criteria for workstation design. In <i>Advances in Manufacturing, Production Management and Process Control: Proceedings of the AHFE 2019 International Conference on Human Aspects of Advanced Manufacturing, and the AHFE International Conference on Advanced Production Management and Process Control, July 24-28, 2019, Washington DC, USA 10</i> (pp. 161-173). Springer International Publishing.</p>	

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Table 3. Activities in the CEEPUS Network in the 2021 - 2022 academic year

Partners involved	Type of activity, details description and outcomes
Conferences and workshops	
University of Timisoara, Romania (organizer) with participants from Hungary, Slovenia, Poland, Bulgaria, Croatia, Serbia	ErgoWork 2022 International Conference (16-18 June 2020), http://www.mpt.upt.ro/cercetare/conferinte/ergowork.html Publications: <ul style="list-style-type: none"> 52 papers published in Acta Technica Napocensis - Series: Applied Mathematics, Mechanics, and Engineering (Clarivate Analytics – Emerging Sources Citation Index – Indexed), vol. 64, Special Issue 1 (2021), https://atnamam.utcluj.ro/index.php/Acta 12 selected papers published in Human Systems Management journal (Clarivate Analytics – Emerging Sources Citation Index), https://www.iospress.nl/journal/human-systems-management/, special issue: Draghici A. (Ed.), “Changes and challenges of human systems management during and after the pandemic”, vol. 39, no. 4.
University of Zagreb, Croatia (organizer) with participants from Romania, Hungary, Slovenia	9th International Ergonomics Conference - ERGONOMICS 2022. Event was organized as (Hybrid event) on December 7-10, 2022, in Zagreb, Croatia, https://www.h-e-d.hr/conferences.htm The post-conference Proceedings indexed in Scopus with full texts of all accepted and reviewed papers will be published by Springer titled "Proceedings of the 9th International Ergonomics Conference - ERGONOMICS 2022". Proceedings will be included is the series "Lecture Notes in Networks and Systems" with ISSN 2367-3370.
University of Maribor, Slovenia with participants from Serbia, Croatia	9th International Summer School on Logistics. The new logistics reality: Delivery with drones, 12 – 18 June 2022, http://summerschool.fl.um.si/
Obuda University, Hungary with ALL partners involvement	Sessions of online training and consultations on Ergonomics and Human Factors with: <ul style="list-style-type: none"> Informative session for sharing the news from FEES (https://www.ergonomics-fees.eu/) and IEA (https://iea.cc/) Promote the network (activities, opportunities and collaboration results) during the specific training or teaching classes with Bachelor and Master students
Publications (articles, book chapters etc.)	
[1]	Draghici, A., & Ivascu, L. (2022). <i>Sustainability and Innovation in Manufacturing Enterprises: Indicators, Models and Assessment for Industry 5.0</i> . Springer Singapore. (BOOK)
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- [12] Draghici, A., & Ivascu, L. (2022). Green Manufacturing in the Context of Circular Economy. *Sustainability and Innovation in Manufacturing Enterprises: Indicators, Models and Assessment for Industry 5.0*, 1-15.
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TO BE Published:

- [1] Gajšek B., Cvahte Ojsteršek T. (2022). The Usefulness of Eye-Tracking Glasses in the Technological Upgrade of the Manual Workplace – an Ergonomic Aspect. *Proceedings of the 9th International Ergonomics Conference - ERGONOMICS 2022*
- [2] Neag P. N., Boatca M. E., Draghici A. (2022). Occupational Safety with Artificial Intelligence Application for Ergonomic Risk Assessment. *Proceedings of the 9th International Ergonomics Conference - ERGONOMICS 2022*
- [3] Neag P. N., Boatca M. E., Draghici A. (2022). Ergonomics for employees' satisfaction in lean manufacturing systems. *Proceedings of the 9th International Ergonomics Conference - ERGONOMICS 2022*
- [4] Farago F., Szabo G. (2022). Qualitative Assessment of the Occupational Health and Safety Knowledge Management Practices of Hungarian Companies. *Proceedings of the 9th International Ergonomics Conference - ERGONOMICS 2022*
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3.2. Activities in academic year 2021 - 2022

During the pandemic crisis, mobilities within the CEEPUS Network were more sporadic, but joint research kept the same pace. The partners continued to work and communicate online, in hybrid manner and also face-to-face, which contributed to the generation of important research results, worthwhile for all. Table 2 presents, in a centralized way, the activities carried out within the CEEPUS Network, with significant details regarding the involvement of partners and the results obtained.

In the 2021/22 academic year the most important event of the CEEPUS Network was the ErgoWork 2022 International Conference on Ergonomics and Workplace Management, 16-18 June 2022, Timișoara, Romania, with more than 100 participants from universities, research centres and industry (the conference was organized hybrid).

Planned mobility actions: in the 2022/23 academic year, are meant to harmonise the content of educational curricula (up-date and introducing new topics) and research activities. The planned (approved and already accepted) mobilities between CEEPUS Network partners will provide the opportunities for:

- Guest lecturing for master and PhD groups of students (enrolled in different engineering programmes),
- Guest consultation and offering support for bachelor, master, and PhD programs. The focus will be on supporting common ergonomics and human factors research for PhD students:
- Joint research and project work for student teams coming from different universities/faculties partners in the Network;

- Short-term student mobility and student mobility for one semester.

The successful virtual PhD/MSC Workshop will be developed having the primary arena for continuous networking among students and faculty members of our network partners and beyond. An important aspect of the mobilities will be to facilitate the attendance of each other's conferences and scientific events, thus supporting the international committees and improving the scientific quality of the publications. The plan for 2022-2023 academic year is to proceed with the existing joint actions and start some small new scales ones.

IV. OPERATIONAL ACTIONS AND PARTNERS CONTRIBUTIONS

4.1. Actions and activities in 2022 - 2023

Operational actions planned to be developed in the academic year 2022-2023 are aligned with the already existing traditional events and actions and will benefit by the resources (financial, sponsorships, material, financial, time, human resources etc.) and capacities (for experimental and applicative studies, consulting contracts with industry etc.) of all partners.

Knowledge and innovation transfer between partners involved the CEEPUS Network will be a priority. Through the CEEPUS Network webpage (<https://sites.google.com/view/ceepusergo/hf/home>), partners could share creative content, news, publication, and mobility opportunities. These are provided after the regular virtual coordinator meetings; a coordinator meeting is planned to be organized on 20-21 October 2023 during the International Symposium on Management, organized by Politehnica University

of Timisoara, Romania, when an Ergo Workshop is planned to be developed (additional resources will be provided through other programmes and by sponsors).

In addition, the network management has been improved by implementing a shared calendar, thesis

topic/research inventory and file folder. Each partner in the CEEPUS Network implements mutually determined actions. Additional partnership contributions are presented in Tabel 4.

Table 4. Actions and activities in the CEEPUS Network in the 2022 - 2023 academic year

Partner	Type of action, activity with significant details description
Óbuda University, Budapest, Hungary	Involvement and support the event of the Hungarian Ergonomic Society who will organize an Ergonomic Summer University from 3 to 8 July 2023. Jointly, a coordinator meeting of the CEEPUS Network will be organized in connection with the event.
IMC University of Applied Sciences Krems, Austria	They want to establish student and teacher exchange with flexible short and long mobilities. Also, they plan to organize a summer school on topics like VR/AR
Technical University of Varna, Bulgaria	Will continue the support of the activities and action in the Network at the local and national level. See the opened official section of CEEPUS on the university web page: http://www2.tu-varna.bg/tu-varna/images/international/CEEPUS_TUV_2020.pdf
University of Zagreb, Croatia	On the 50th anniversary of the Croatian Ergonomics Society, in 2024 they plan to organize the international conference Ergonomics 2024 together with a PhD workshop and a round table with current topics in ergonomics.
Poznan University of Technology, Poland	They implement mutually determined actions and work on the joint program. In addition, they organize the International Seminar on Ergonomics, May 2022, Poznan, Poland – event related and with the support of the CEEPUS Network.
Politehnica University of Timisoara, Romania	They organize ErgoWork 2022 conference, as an event related to CEEPUS network. They prepare the ErgoWork workshop (5-7 papers and debate around the proposed research topics) during the International Symposium in Management 2023 (SIM 2023), 20-21 Oct. 2023, Timisoara, Romania. Prepare a proposal of an academic book of synthesis “Contemporary Ergonomics Issues” with contributions from all partners.
University of Belgrade, Serbia	They plan to support short term and long-term incoming and outgoing mobilities of ergonomic experts engaged in this project, to realise presentations to students on contemporary topics in ergonomics, to present novel approaches and methods in ergonomics. They agree on providing consultations directed to the improvement of the education process in ergonomics and participation in the creation of standard courses in the field of ergonomics that will be applicable in part or in all of the countries that participate in this project. The university is most interested in receiving and sending ergonomic experts that will contribute through consultation to the realisation of high-quality PhD theses of students.
University of Maribor, Faculty of Logistics in Celje, Slovenia	They are still extremely interested in foreign teaching practices and practice with membership in European and global ergonomics societies. They would like to strengthen connections within Slovenia, among professors from different institutions, to be able to discover interested Master and PhD students, who would be motivated to participate in CEEPUS Network. To get closer to these goals, the establishment of study programs in English helps a lot; these will be fully implemented in the next three years, which means that the faculty will become suitable for student exchanges for the entire semester. Currently, only short-term mobility and participation in co-mentorships for diploma theses at all levels of Bologna studies are feasible. Slovenian partners would like to continue with recognition of the potential of incorporation of ergonomics topics in the logistics curriculum that would give them a starting point to engage master and PhD students in enriched study programs or to send them abroad to study ergonomics in the logistics research domain. They plan to invite professors and students from CEEPUS Network to work intensive event in study year 2023/24. Title will be announced later in spring 2023. Thematic will encompass ergonomics and human factors
University of Mostar, Bosnia-Herzegovina Faculty of Manufacturing Technologies in Presov	They would like to support the CEEPUS network mainly through students, teachers, and scientific researchers mobilities, during which there would be discussions and mutual sharing of experiences in the educational field with the aim of bringing education closer to the standards of European universities. They consider activities focused on ergonomics and human factors, or the needs of people with special health needs, to be important elements of actual educational process, therefore they appreciate the opportunity to participate in joint meetings in the framework of mobilities, which will create the basis for the possibility of developing further cooperation in the framework of research and the preparation of joint projects

The CEEPUS network activities and results are constantly promoted online and face-to-face in our institutions to prospective students directly, and we had presentations to students as part of mobilities. We prompted the network at the ErgoWork international conferences series, on the Federation of European Ergonomics Societies (FEES) website, and in the

FEES' newsletters. Partners are promoting the CEEPUS network constantly in their university community (with the support of the teaching and research staff involved). In addition, all partners in the Network agree on supporting:

- The ErgoWork international conference organize in partnership by Politehnica

- University of Timisoara, Romania and the ErgoWork association in Romania;
- The Ergonomics 2022 international conference organize by University of Zagreb, Croatia in partnership with different national associations of ergonomics.

4.2. Selection Criteria for Mobilities

Student mobility - Partners recruit students interested in studying abroad. The sending and receiving partners discuss possible mobility objectives and evaluate study opportunities. At the partner meeting, there have been agreed to assess candidates based on their language skills, appropriateness of the topic, and study opportunities. Students are selected for mobility by consensus. Priority is given to PhD students and joint research and project work.

Short Term Student mobility - Applicants are asked to prepare a ten-minute motivation video. After watching videos, the coordinators make the selections with consensus; language skills, topic and relevance to the network are important criteria for selection. Priority is given to PhD students for joint research and project work and mobilities to intensive courses.

Teacher mobility - Teaching and research staff will be assessed for mobility applications according to the need of the host institutions. Decision factors are the expected interest in the lecture topic, the number of students working on related research and the applicant's scientific performance and language skills. Priority is given to activities at the postgraduate level.

Coordination - Regular one-hour meetings are schedule by zoom with all CEEPUS Network partners first Wednesday every month at 6 PM Budapest time; ad-hoc meetings are organized on-demand for urgent matters with the involved parties and the coordinator. The meeting minutes and other documents are stored in a shared cloud directory (e.g., materials discussed at the monthly coordinator meetings, invitations as call for papers, plans and templates for the publications etc.).

The Network management has been improved by implementing: a shared calendar, thesis topic/research inventory and file folder.

Recognition - The basis of the mutual recognition is the International Ergonomics Association (IEA) endorsed minimum criteria of the Registration of European Ergonomists (EurErg) which defines the educational requirements in the ETCS system. With some partners, we are using this system for a decade together, and we are very experienced to level various ergonomics courses. All the partners in the network know well the EurErg system, and we will use it in the network. Previous Erasmus PhD mobilities showed that we could work together to mentor PhD researches.

Special Merit - The CEEPUS Network supports the ongoing activities at the Federation of European Ergonomics Societies (FEES) and in the Centre of Registration of European Ergonomists (CREE).

“The areas of knowledge (A – K) in accordance with CREE guidelines require evidence of primary education across the following Areas of Knowledge:

- A. Principles of Ergonomics;
- B. Populations and General Human Characteristics;
- C. Design of technical systems;
- D. Research, evaluation, and investigative techniques;
- E. Professional issues;
- F. Ergonomics: Activity and Work Analysis;
- G. Ergonomic Interventions;
- H. Ergonomics: physiological and physical aspects;
- I. Ergonomics: psychological and cognitive aspects;
- J. Ergonomics: social and organisational aspects;
- K. Project work.

A minimum of 2 ECTS required for each of these Areas of Knowledge. It is necessary to have covered most of the recommended topics within an Area of Knowledge but not necessarily all of them. Building on this primary education, an ergonomist must show studies at an advanced level of knowledge in ergonomics, with a minimum total of 60 ECTS. An advanced level of knowledge can be achieved within cognitive, physical, or organisational ergonomics or in a combination of these. The supervised project work (K) must have between and 20 ECTS| (CREE, 2022).

In the CEEPUS Network some of the members have already announced their intention to follow the CREE procedure for being recognized as European Ergonomists certified.

Finally, it is important to mention that the added value on FEES side is to bring together ergonomists / human factor professionals and to encourage the creation of national ergonomics societies in the Balkan region. On the CREE side, the expected outcome is to extend the certification system and improve the mutual recognition of the ergonomics and human factors profession. The CEEPUS Network is promoted in these organisations using the activities developed and results achieved; most of the The CEEPUS Network activities, actions and events are supported by these organisations.

4.3. Extension of the CEEPUS Network Research Activities by the Development of Other Projects

Network members submitted a no-win proposal: H2020-SC1-DTH-2018-2020 (Digital transformation in Health and Care) Proposal number: 101017556 Proposal acronym: alw_EDl.

Thanks to the CEEPUS Network collaborations, there were submitted five project proposal in the framework of Erasmus+, Key Action 220, Higher Education - Cooperation partnerships, some of the projects were approved for being financed.

- ID KA220-HED-0C8D3623 "Life in the AI Era" a two-year project aiming to explore the relationship between Artificial Intelligence (AI) and everyday life, compile a toolbox, and develop e-learning

educational material for students in higher education (<https://lifeintheaiera.eu/>).

- ID KA220-HED-0D601A76 "ErgoDesign" is a successful three-year project, aiming to systematize ergonomics and 3D printing knowledge for healthcare purposes, gather available tools, and develop e-learning educational material (<http://ergodesigner.eu/>).

The project, "*SLog4.0 - Sustainable Logistics4.0: Digital and Green Skills for Boosting Innovation and Sustainability of the Logistics Sector*", was also approved to be financed supported by EU funds and started on 1st September 2022. The Slovene team work together with Politechnika Poznanska from Poland. (<https://slog4.put.poznan.pl/>).

Another successful project developed and implemented by some partners of the CEEPUS Network is "INNO3D+ - 3D Printing Support Service for Innovative Citizens" project (contract no. 2019-1-IE203-000693INNO3D, <https://www.inno3d.eu/>). Politehnica University of Timisoara, Romania and Constantine, the Philosopher University in Nitra, Slovakia were involved in this project which aims to design, to improve and diversify the services offered to users of university (through their libraries) by offering library users key skills and the opportunity to develop 3D printing competencies. The project has been dedicated to the development of a complex training program possible to be implemented with the support of the created makerspaces that provide 3D printing services. Human-machine/3D printers' interaction was one of the core topics, training materials being focused on maintenance operations.

In the nearest future, CEEPUS Network partners plan to prepare a research project proposal in the field of ergonomics and logistics to apply for a bilateral research project in the framework of the WEAVE project call.

In addition, Politehnica University of Timisoara, Romania, Faculty of Management in Production and Transportation joined another CEEPUS network: RO-0202-16-2223 with the title: "*Implementation and utilization of e-learning systems in the production engineering network study area*".

Partners CEEPUS network are committed to using modern teaching methods. The use of digital technologies raises both professional content and educational methodological issues for us, in which we are taking a pioneering role. Partners are active in the use of e-learning. Before and most during the pandemic, e-learning materials have been developed (in the field of ergonomics, human factors, occupational health, and safety) and most of the teaching staff of the Network has participated in local and international curriculum development programs. The most important e-learning courses that has been supported and followed by most of the partners is "TRAIN4HCWORK" (contract no. 2018-1-ES01-KA203-050887, <http://www.train4work.eu/>). During the project implementation has been created an online

course focused on the design of human-centred workplaces that will contribute to address actual challenges in industry.

The CEEPUS Network members also take advantage of the ERASMUS+ mobility opportunity to implement student and teacher study trips. Thus, partners established bilateral agreements in scientific fields close to the CEEPUS Network. The advantage of CEEPUS Network mobilities is the members' closer cooperation and the implementation's flexibility. The ERASMUS+ program, on the other hand, offers more favourable financial conditions.

V. CONCLUSIONS AND FINAL REMARKS

The Ergonomics and Human Factors Regional Educational CEEPUS Network mission is to contribute to the competitiveness of the Danube Region by providing e competency on the human-oriented product, process, and organizational innovation. The goal of the Ergonomics and Human Factors Regional Educational CEEPUS Network is to strengthen the ongoing collaboration of the participating institutions, to create a formal academic structure for student exchange on bachelor, master, and doctoral level, to participate in each other's master and doctoral programs, and to develop shared training contents, university courses, and joint doctoral programs in the long term. In addition, the common research and publications will better valorise the existing infrastructure and knowledge of all partners creating valuable added value to the ergonomics and human factors field of science.

Although the pandemic crisis affected mobilities and collaboration in the CEEPUS network, it turned out that all partners were involved in activities and actions at the level of the period 2020 - 2022. This new type of collaboration (online or hybrid) led to the following conclusions and remarks.

Intensifying the use of new digital technologies in ergonomics educational activity, as well as in the case of research activity. Multimedia technologies are increasingly present in the relationship between network partners. Thus, the mobility periods were more intensively used for collaboration between specialists, between researchers of all categories and by students.

Two international scientific events have become traditional: the ErgoWork conference organized by Politehnica University of Timisoara, Romania and the ERGONOMICS conference organized by Zagreb University, both of which are biannual events (organized in 2020, 2022 and most likely in 2024) that polarize not only researchers from the CEEPUS network but and other specialists affiliated to different national ergonomics societies / associations. FEES supports the two conferences accordingly. The research results were fruitful through joint publications, of high scientific quality. Thus, the network became visible at the news of some prestigious

communities of specialists, at the level of FEES and IEA. Although apparently the partners of the CEEPUS network have different and divergent competences, within the joint activities and publications, a convergence and a complementarity of these competences can be noted. Diversity can only be integrated in an interdisciplinary approach, as it happens in the case of ergonomic education and research.

The obstacles, barriers that induce problems in the mobilities development were:

- The Covid-19 pandemic restrictions (from 2020 till April 2022);
- The situation in the Eastern part of Europe generated by the war in Ukraine (from February 2022 till now) and that will low the frequency of the mobilities in the neighbouring countries (e.g., Poland);
- The CEEPUS financial support, and most providing substantial amount of the CEEPUS grant for PhD students' research. It seems that most of the students

are less attract by this type of mobilities due to their low rate;

- The doctoral program of three/four years requires a regular stay in the host countries of the PhD students and thus, they will not have time for mobility.

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A Debate on Main Aspects of Safety Management and Ergonomics in Georgia

Jemma SAAKYAN¹, Anca DRAGHICI², Ilie TAUCEAN³

Abstract – Safety management and ergonomic working conditions are two of the decisive factors in the organizational health of employees. In recent decades, industrialized countries have experienced significant changes in the functioning of labor markets and safety management systems. Increased commodity market competition, highly turbulent aggregate demand, and rapid technological advances have contributed to increased pressure on labor efficiency. Safety management and ergonomic measures are considered as one of the main important aspects of organizational behavior, which is important to regulate both at a governmental and organizational level. It is necessary to mention that ergonomics considers the physical strength and size of people. It reduces the strain on the workplace and thereby improves a person's ability to work better. Georgia is one of the Post-Soviet Union countries, located in the middle of Europe and Asia, in the South Caucasus region, where capitalism and the market economy were implemented during the last two decades. The main aspects of safety management and ergonomics are interesting in the country, which are proved by laws and accepted by national governmental agencies. Each organizational unit must consider these aspects in order to improve and establish better conditions for the working process.

Keywords *Safety Management, ergonomics, modern technologies, safety awareness.*

an element of business, as it happens in the whole civilized world. However, technical measures to guarantee safety management in Georgia are not accompanied by a proper combination with the managerial component.

The supervisory structures (or rather the officials who control them, major governmental agencies) have chosen a special way of development here too, which is built on a system of fines, which does not really motivate enterprises to create and even more so to certify safety management systems for activities. In post-Soviet society, there was and still is, moreover, a huge number of far-fetched criteria, which absolutely do not reflect the actual reality, but serve only to please certain groups of people who achieve success by manipulating mysterious figures and misleading the whole sector. To get away from this leading nowhere situation, let us consider the real impact of safety management systems in Georgia and the impact of these systems on the innovative development of production [1].

The analysis of modern safety management systems, by which the management built unified world rules, allows us to conclude that the local systems need to be developed.

I. INTRODUCTION

Safety management is a state of labor conditions that excludes the impact on workers of dangerous and harmful factors in production systems.

Safety management has always been one of the most important indicators of the development of society. It is becoming a difficult task to evaluate the system of safety management of enterprise, its invariance from external events. Considering that for 75 years Georgia has been living according to the laws, which poorly correlated with the laws of the world society, it is very difficult to establish a legitimate safety assessment system. The quality management systems are quite actively implemented in Georgia as

II. LITERATURE REVIEW

Safety management and ergonomic studies have been studied for as long as humanity has existed. Ergonomics and safety management is a discipline that comprehensively studies a person or a group of people in the specific conditions of modern production. The emergence of ergonomics is related to the enormous technical progress that we have observed in the last century. The first studies in this field can be traced back to the twentieth century. At that time, in the USA, Japan, and many other countries, scientists of various disciplines studied the process of labor activity for the maximum use of human resources [2].

¹ Georgian Technical University, Tbilisi, Georgia, jemmasaakyan@gmail.com

² Politehnica University of Timisoara, Romania, anca.draghici@upt.ro

³ Politehnica University of Timisoara, Romania, ilie.taucean@upt.ro

Technical progress has led to the mechanization and automation of the production process. This triggered the need to develop a new discipline in ergonomics and safety management.

The term "ergonomics" itself was suggested in 1857 by the Polish scholar, Wojciech Jastrzębowski. However, it did not become widespread until the fifties, when they organized the Ergonomic Research Society, with which we can associate the formation of ergonomics as an independent science [3].

Jaana Sepp and Karin Reihold (representing the Tallinn University of Technology) have published Human Factors and Ergonomics in Safety Management in Healthcare: Building New Relationships (2018) and defined the comprehensive understanding of classical and modern theories of ergonomics and safety management systems. Their practical implications allow us to understand the role of ergonomics in a holistic context, to cover the whole system of employers and employees, internally to obtain the maximum benefit in a strategic management that matches the corporate opportunities with environmental requirements and allows them to obtain most effectively the desired [4].

Considering the specificity of ergonomic and safety management, it is important to study man-machine-working environment systems. The development of production based on increased efficiency and quality is the main way to achieve the fundamental, long-term goals of our society's economy. High production efficiency is an extremely multifaceted problem. Human capabilities are expanding due to the development of tools, but the tools often turn out to be so complex or irrationally designed that it becomes difficult to use them. Analysis of the efficiency of automated control systems shows that operator error is often the cause of system failure [5].

One of the important studies of the ergonomic and safety management systems of Georgian scientific basis was published by Tbilisi State University in the Faculty of Economics and Business. It analyzes the influence of ergonomic and safety management of external and internal circumstances and environmental conditions on the sample of Georgian organizations [6].

III. RESEARCH METHODOLOGY

To study and analyze safety management and ergonomic aspects in Georgia, we used mixed research methods such as qualitative and statistical. The qualitative approach of research is the main way of studying facts about our topic, which describes the main aspects within their natural settings [7]. The statistical method of research is the collection, analysis, and presentation of the proper amount of data to make some frames according to the research topic.[8].

A combination of these methods provides the opportunity to study and research topics deeply and

intensively. The paper used a case study of one of the organizations functioning in Georgia.

IV. CASE STUDIES AND DEBATE ON PRACTICAL SAFETY MANAGEMENT AND ERGONOMICS

A. *An inventory of consulting companies and services providers*

There are governing mechanisms in ergonomics and safe working conditions management in Georgia, regulated via the national legal framework, state policy context, the Organic Law of Georgia on Occupational Safety, and the International Labor Organization approaches to improving working conditions. Health and safety practices vary from each country to country with different approaches to laws, and in Georgia, organizations could improve the safe management and ergonomics conditions of their organization based on before mention legislation framework.

In 2019, Georgian state agencies reinstated the main act of Safety Workplace and Management. The major purpose of the mentioned act is to define the basic requirements and general principles of preventive measures related to occupational safety, existing and expected hazards, prevention of accidents and occupational diseases, training of workers, providing information and advice, security and health, and equal participation of workers in protection issues. This law regulates the rights, duties, and responsibilities of public authorities, employers, employees, employee representatives, and other persons in the workplace related to the creation of safe management and healthy working conditions [9].

Important attention has been given to "Safety and Health Management Certificate". For example, there are consulting companies providing practical training in demand by different industrial companies or economic areas/fields. They offer training programs which are designed to develop skills and competences leading to subject matter expertise that they can apply and transfer quickly in their workplace getting improvements in work safety and ergonomics.

The companies advise and supports different learners to reduce and prevent accidents at work by going beyond regulatory compliance and building an effective safety and health management system based on achieving the Safety and Health Management Certificate. The consulting process focuses on training and development of trainees' accident investigation skills, too. Examples of such companies are (some of them do not have web pages?!):

- HSE Consulting;
- Gergili HSE, <https://gergili.ge/shromis-usaprtxoeba/>;
- Safety Products;
- OSHA Georgia, <https://hsegeorgia.ge/>;
- MBG Safety, <https://safety.mb.ge/>;
- SMG Group, <https://smgroup.ge/> etc.

An important aspect of the certification development skills and competences are based on the advanced safety management course and the related knowledge acquisition process. The consultants recognized the following: “developing an intentional safety culture requires much more than programs and regulatory compliance”; during the course, trainees will achieve knowledge of “understanding human performance principles, brain centered hazards, safety leadership traits, and how to truly measure the effectiveness of your safety management system”. Thus, the graduates of this course will prepare to be safety managers in different companies.

A lot of specialized companies provide personal protective equipment (PPE) for different industries and economic fields (e.g., General Supply Georgia, <https://www.facebook.com/GeneralSupplyGeorgia>)

B. Assessment of using level of safety management and ergonomics in Georgia, organization Crystal Ltd

To understand the main aspects of safety management systems in Georgia, this paper includes results of research in one organization, carried out by Tbilisi State University in the Faculty of Economics and Business. The paper provides an overview and analysis of workplace improvement measures, strategies in the organization, safety, and the key ergonomics issues related to organizational success.

LTD. MCO Crystal is a dynamically developing local microfinance organization, which contributes to the development of the micro and small business sector in Georgia.

Currently, "Crystal" has 1200 employees. The organization is represented in the market by 56 branches and 12 service centers [10].

The organization provides improved working conditions for employees, which is reflected in the following: Since 2018, there has been regular training to improve working conditions. The training usually discusses issues such as: the rules of sitting, avoiding ill health, sitting properly, and computer keyboard and monitor placement correctly on the table. The organization also provides a temperature with a ventilation system. The evacuation plan for unforeseen events such as fire, earthquake, etc., is placed on the wall. All employees have been trained in how to use fire extinguishers. Recommendations on how to act in case of unforeseen events such as robbery are discussed. Training is conducted in stages for both branches and head office staff.

The situations of employees of middle and managerial level employed in LTD "MSO" Crystal have been researched by survey method to analyze them according to safety management and ergonomics. Collected information and data were processed and analyzed in qualitative and quantitative ways.

Of the 80 respondents surveyed, there were 24 employees aged 18–25, 34 aged 25–30, 18 aged 30–40, and 4 above 40. The main part of the research includes

questions about the satisfaction of employers, their preference to desire, and the working environment. Most employers (75%) are satisfied with working conditions and management structures in their organization. 20% of employers are neutral about the situation in their organization, and the last 5% are unsatisfied with working conditions. The question to which characteristics of ergonomic working conditions they preferred, we received answers – 44% improving personal space in organizations, 29% improvement in communication, and 27% improvement in lighting systems.

The second important question is regarding training and studying processes in ergonomics. What is the frequency of conducted training? The answer of 51% of surveyors is once a year, 28% of answers is once every two years and 11% of answers is once every six months. As we checked in the organization, they usually conduct training about ergonomics and safety management on average once a year, which includes activities for 4-5 hours. In terms of working conditions improving, most employers mentioned that open communication and trust are two important things for dealing with ergonomic and managerial aspects. The essential point, which we identified during analyses of research studies, is that 85% of them are satisfied with working conditions and environmental ergonomic issues in their organization.

The formation and development of the main managerial and ergonomic systems in an organization is essential. The introduction of the results of ergonomic research into practice has a significant socio-economic effect.

CONCLUSION

Safety management and ergonomics are considered as one of the main aspects of the establishment of a healthy working environment.

The point of the review of the Georgian literature presented in this article reveals a paucity of research supporting the relationship between ergonomics and safety, appropriate skill development, and company performance.

Nevertheless, research shows some correlation between increased demand and skills in the main aspects of ergonomic management and safety management in organizations, which is in direct association with employers' level of satisfaction.

Moreover, the paper identifies the importance of self-efficacy in relation to performance enhancement issues. There has been very little research on these issues in Georgia, and an empirical study of the main areas mentioned in the paper will help to identify areas for improving organizational conditions and success in the future.

As the paper shows, strategies and tactics for improving working conditions may vary from organization to organization, but they have several common components that involve management taking

all possible measures in each environment to improve working conditions and employee productivity.

The assessment of safety management and ergonomics in Georgia is on average level, dependent on low integration of modern technologies in different segments of production, but the support of the government side and accepted regulations regarding this topic play a tremendous role in development strategies.

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