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

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Transactions on ENGINEERING AND MANAGEMENT

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Editorial

Anca DRĂGHICI[1]

The Editorial Board announces that started with the 2018 volume our scientific journal has been accepted and indexed in the ***EBSCO database***. We considered this a confirmation of the publishing and scientific quality of the journal. The indexation process was preceded by completing the application addressed to EBSCO, that was followed by an evaluation of the journal, made based on the information send. We must mention that only scientific journals that meet the appropriate standards for scientific journals, determined by the best periodicals in the world and because we manage to publish two issues per year. A good beginning and a motivation to go further. The indexation enables our journal: "***Scientific Bulletin of Politehnica University of Timisoara – Transaction on Engineering and Management***" (ISSN 2392-7364) to access additional services dedicated only to the Editors and Publishers of scientific journals, which received permission to be upload in EBSCO on-line repository started with 2018.

Based on our last achievements (2018 and 2019), we are motivated to increase the quality of the research and to encourage the publication of multidisciplinary / interdisciplinary works of a large diversity of researchers.

It has been a good and successful initiative that the first issue of each year to be dedicated to dissemination actions of young researches, master and PhD. students and the second one, to senior researchers who presents their las findings through extended research articles. This habit has started in 2018 and will continue under the supervision of the reviewers and the Editorial Board.

We would like to address worm thanks to the reviewers (members of the *Associated Editors)* 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 implications of the members 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) in supporting each issues of the Scientific Bulletin publication. Furthermore, 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).

EBSCO is the leading provider of research databases, e-journals, magazine subscriptions, e-books and discovery service to libraries of all kinds. For more than 70 years, we've partnered with libraries to improve research with quality content and technology.

The current issue presents a collection of articles reflecting actual topics and research thematic in the field of economics, quality management and educational aspects related to project management. It seems that sustainable development is the key aspects approached by all articles.

The first paper has been developed by Prof. Claudiu ALBULESCU, Lecturer Dr. Caius LUMINOSU and Lecturer Dr. Liana PATER (all authors from the FMPT/UPT, Romania) and it is a study on the "***Wastewater Treatment in European Union's Countries – Economy of Access, Determinants, Legislation and Implications in Urban Areas***". In addition, the research has been supported by an on-going grant/project of the Romanian National Authority for Scientific Research and Innovation, CNCS – UEFISCDI, project number PN-III-P1-1.1-TE-2016-0142.

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[2] *Information are available at: http://www.mpt.upt.ro/eng/research/research-center.html*

The primary purpose of the paper is to present the regulatory framework of wastewater treatment and the cooperation between EU and OECD inside the European Union Water Initiative. We also perform an empirical analysis of wastewater treatment determinants in a set of 28 OECD countries, using annual data for the period 2000 to 2017. The panel data analysis reveals that the access to wastewater treatment services is positively influenced by the level of revenue per capita and by the R&D expenditure. At the same time, the energy prices negatively affect the access to wastewater treatment services. The EU membership has no significant impact on the services access rate.

The second paper has been developed by PhD. student Cristina Diana SZOCS and, her PhD supervisor, Prof. Constantin Dan DUMITRESCU (all authors from FMPT/UPT, Romania). Their research entitled "***Dynamics of the Cost Related to the Large-Scale Production of Automotive Components***" reflects some preliminary results of their preoccupation associated with the PhD programe followed by the student. In their article, authors state that nowadays, we are aware that quality has a high price. To meet the quality level required by the client, the organization must be mindful of and understand the importance of quality costs. The idea that quality has a high price must first be considered from the point of view of the expenses with non-quality. In this context, the prime objective of this article is to evaluate and analyze non-quality costs, establishing a procedure for collecting and assessing non-quality costs. Once the cost of non-quality is determined, the organization is given a chance to decide how to use its resources to reduce and prevent quality costs pro-actively.

The third paper presents the result of a study entitled: "***Environmental Protection. A Debate on Economic Aspects"*** and has been developed by lecturer Dr. Dan DURAN (FMPT/UPT, Romania). Researches draw attention to the conflict between industrial civilization and environment and mention two aspects: the tendency of depletion of natural energy resources, raw materials and food or renewable consumption on a pace above their capacity of regeneration and physical damage and pollution of the environment: water, air and land. In the context of the paper, the efforts for avoiding pollution or to protect the remaining resources are analyzed based on the expenditures and the investments made with these scopes. The author considered that there should be a directly relationship between expenditure and the environment "health" state. The involvement tendency of increasingly amounts for environmental protection should create cleaner and less polluted environment.

The last paper presents "***A Study on Students' Social Competencies***" developed by a team of two PhD Students: Dana FATOL and Diana Florina ROBESCU (FMPT/UPT, Romania). The research has been focused on the social skills development in the case of students from the Engineering and Management specialization, but also, for the young researchers (PhD. students enrolled in different engineering specializations). The research variables take int consideration employment or non-employment position of students. Research results have re-oriented the content of the subjects dedicated to students soft skills development.

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Wastewater Treatment in European Union's Countries – Economy of Access, Determinants, Legislation and Implications in Urban Areas

Claudiu ALBULESCU[1], Caius LUMINOSU[2], Liana PATER[3]

Abstract – The primary purpose of the paper is to present the regulatory framework of wastewater treatment and the cooperation between EU and OECD inside the European Union Water Initiative. We also perform an empirical analysis of wastewater treatment determinants in a set of 28 OECD countries, using annual data for the period 2000 to 2017. The panel data analysis reveals that the access to wastewater treatment services is positively influenced by the level of revenue per capita and by the R&D expenditure. At the same time, the energy prices negatively affect the access to wastewater treatment services. The EU membership has no significant impact on the services access rate.

Keywords: Wastewater management, OECD, EU legislation, water services, access and costs to wastewater treatment

I. INTRODUCTION

The importance of wastewater treatment in the context of circular economy rests not only on economical value. Rather it is regarded by the Organization for Economic Co-operation and Development (OECD), the international organization whose goal is to promote development of human society not only in its member states, but all over the world with the promise of a better future as a key element in realizing a fundamental development goal for mankind: sustainable access to water. Statistics of the United Nations (UN) show that still a significant part of the world's population suffers not only from the lack of access to freshwater resources, but also to sanitation services, that include also the treatment of wastewater.

To mitigate this situation, the UN have declared access to water and, as part of it, to sanitation a sustainable development goal. Subsequent efforts of the international community have materialized in the form of instruments of co-operation between states such as by means of the OECD and by regional organizations such as the EU. While the legal nature of these approaches is different, they all rely on the achievement of the same goal – a functioning water economy, including the aspect of providing wastewater treatment in order to close the cycle of water use. Further, the determinants of the access rate to wastewater treatment services are poorly investigated in the empirical literature. Against this background, our contribution to the literature are twofold.

The first contribution is represented by an overview and analysis of the nature of regulations existing at the transnational level, as a form of co-operation of regulations created by different international organizations, the UN, the OECD and the European Union (EU). While regulation proposed by the UN and the OECD provide for a voluntary implementation by member states or stakeholders, the framework of EU legislation is mandatory in nature, leaving only few aspects to be drawn up by the EU states.

The second contribution is empirical. Different from recent studies that analyze the determinants and implications of wastewater treatment with a focus on emerging economies (i.e. Li et al., 2016; Managi and Kaneko, 2009; Wang and Yang, 2016; Wang et al., 2017) we investigate the determinants of population's access to wastewater treatment services in OECD countries. Likewise, we consider the role of economic development, technological development and energy prices in influencing the access to wastewater treatment services. We perform a panel data analysis for the period between 2000 and 2017 using OECD statistics and we compare three static models, namely an Ordinary Least Square (OLS) regression, a fixed effect model and a random effect model. As dependent variables we consider the percentage of population connected to wastewater treatment services, whereas for robustness purpose, we analyze the determinants of the percentage of urban population connected to wastewater treatment services. Using a dummy variable, we control for the EU membership effect. It

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is well-known that the European Commission has dedicated programs and funds to address environmental issues, including wastewater treatment.

We expect that the economic and technological development to have a positive influence on the access to wastewater treatment services. Further, the increase of energy prices might negatively affect the access to wastewater treatment services. This intuition can be explained by the fact that energy prices are directly transferred to water and wastewater prices, which determines the reduction of consumption. Finally, we expect that the EU membership to have a positive impact on wastewater treatment services inside the OECD group of countries.

The rest of the paper present the regulatory framework and water EU policies (Section 2), data and methodology (Section 3), empirical estimations (Section 4) whereas the last section concludes.

II. REGULATIONS AND INTERNATIONAL COOPERATION FOR WASTEWATER TREATMENT

1. The need of international or transnational regulations for wastewater treatment

By tradition, regulating the public sectors and public services has been regarded as one of the core functions of the modern national state. This doctrine had been holding up until the second half of the last century, when environmental issues started to move into the focus of public conscience and also of the international community.

By the last decade of the 20th century, as awareness of the dimension of various environmental problems was rising, it became clear that solutions to issues of this magnitude could only be found by the common effort of most states around the globe.

The management of water in general, including wastewater, has been included in the objectives of the regulatory goals, as water is regarded as a fundamental resource for humanity and at the same time as a vital element of the natural environment that needs protection.

2. Regulation initiatives at the level of the United Nations

In 2000, the General Assembly of the United Nations (UNGA), adopted by resolution the so-called United Nations Millennium Declaration (UNGA 55/2000) containing the Millennium Development Goals (MDGs) to which the member states pledged themselves. It is to be reminded that UNGA resolutions are usually non-binding and depend upon the will of the signatories to be put in practice while no sanction mechanism is provided. All MDGs are voluntary assumed obligations. Target no. Target 7.C of the goals intended to "halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation." As the term sanitation includes the management of wastewater, this resolution can be regarded as the first international regulation referring to this issue at the level of the UN.

In 2015, the year in which the MDGs were to be reached, the UN evaluated the degree of realization of its goals and decided to further them by assuming a second generation of Development Goals, called Sustainable Development Goals (SDGs), by adopting the "2030 Agenda for Sustainable Development" (UNGA 70/2015).

Regarding the water issue, the UN assessed that "the world has met the target of halving the proportion of people without access to improved sources of water, five years ahead of schedule. Between 1990 and 2015, 2.6 billion people gained access to improved drinking water sources. Worldwide 2.1 billion people have gained access to improved sanitation. Despite progress, 2.4 billion are still using unimproved sanitation facilities." (WHO-UNICEF, 2015).

The encouraging results of the implementation of the MDGs has prompted the UN to set the resource water as a separate SDG on its 2030 Agenda. Goal no. 6 "Ensure access to water and sanitation for all" assesses that still "80% of wastewater resulting from human activities is discharged into rivers or sea without any pollution removal" and provides for signatory states that in order to reach the goal by 2030, to "expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programs, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies" and to "support and strengthen the participation of local communities in improving water and sanitation management." (UNGA, 70/2015, Goal 6, incl. 6.A, 6.B)

In conclusion, the regulations regarding wastewater management present on UN-level are broad in scope, lack a direct implementation mechanism, constitute voluntary assumed obligations by each member state but represent a set of desirable goals to be attained in order to ensure a better quality of life and environment.

3. Regulation initiatives at the level of the OECD

The OECD is an intergovernmental organization, its membership being based on economic criteria and its goals focused on economic issues. Recognizing however the impact of the MDGs and SDGs on economic issues and based on the fact that its member states are at the same time members of the UN, the OECD supports the 2030 Agenda for Sustainable Development and strives to ensure that the SDGs are reached. This is to be ensured by the OECD Action Plan on the Sustainable Development Goals "Better Policies for 2030" (OECD Action Plan, 2016).

The main approach of the OECD is that of using its instruments ("peer reviews and learning; monitoring and statistical reporting; policy dialogue; soft law") as a means of support and assessment of member and partner states. It is to be noted, that similar to the UNGA resolutions, the regulatory frameworks provided by the OECD are of voluntary nature and are

based on bi- and multilateral treaties enacted by states and not by the organization itself. There are no direct sanctions (hence the soft law approach) if the SDGs are not met within a specified timeframe. Any type of sanctions would materialize only within the relations between states and not with the organization.

Regarding the role of the OECD in the wastewater management process, as specified in the OECD Water Governance Principles (OECD, 2015), the organization intends to provide water governance recommendations for governments "to design and implement effective, efficient, and inclusive water policies." (OECD, 2015). At the present, the OECD states that over 40 states and various stakeholder groups have endorsed the set of 12 principles.

Principle no. 2 "Managing water at the appropriate scale(s)within integrated basin governance systems to reflect local conditions, and foster co-ordination between the different scales" contains under lit. b) the encouragement to ensure a "sound hydrological cycle management from capture and distribution of freshwater to the release of wastewater and return flows" (OECD, 2015), therein also including the management of wastewater.

Starting out with the approach of meeting the SDGs, including the one relating to water by providing tootle for better governance, the OECD has created implementation tools like the Water Governance Indicator Framework and the evolving water governance practices (OECD, 2018). These tools are to be used by the implementing states and stakeholders, like the water service operators, public or private. Wastewater management is put into the context of the circular water economy (OECD, 2018).

To sum up, the OECD provides interested stakeholders, public and private with different tools which by implementation should make water treatment more effective, efficient and inclusive. In contrast to the regulations provided by the UN, they are designed to work both on a policy and administrative level as well as on economic level. While the UN regulations are addressing only states and setting goals, the OECD offers regulations that contain the principles, the policy proposals and the specific tools for implementation and impact measurement.

4. Regulation framework of the European Union

An entirely different type of regulations is provided by the European Union. The EU is a regional supra-national organization which in contrast to the UN and especially the OECD has the means and scope of creating legally binding legislation and implementing it. The EU has also functioning sanctions mechanisms, embedded in its fundamental treaties. EU legislation can be applied directly or by state implementation within all member states and is mandatory.

Wastewater treatment has been the object of EU legislation, even if water management is not included in primary Union law (Voulvoulis, 2018). The first important step in this field was the adoption of the Urban Wastewater Treatment Directive (Council Directive 91/271/EEC), which ensures the treatment of urban wastewater in all Union member states. The effects of the implementation of this directive in different states have been discussed in literature (Kemp, 2001, Wright, 1992). Also, the progress on implementing the Directive is monitored by the European Commission (EC), as with all implementation of secondary EU law. The Commission presents periodic reports on the status of implementation and is monitoring also the effects on the stakeholders and other defined targets (EC Report, 2017).

The Urban Wastewater Directive provides for very specific targets to be met, like the collection and treatment of waste water in all urban agglomerations as defined, secondary and more advanced treatment of all discharges from urban agglomerations, a requirement for pre-authorization of all discharges of urban wastewater, and of industrial discharges into urban wastewater collection systems, monitoring of the performance of treatment plants and receiving waters; and controls of sewage sludge disposal and re-use, and treated waste water re-use whenever it is appropriate.

This last point of the re-use of treated wastewater is also a key objective of the new Union's commitment to support the realization of the UN SDGs. (EC draft Regulation, 2018) This objective is to be reached by the adoption and implementation of a proposed Regulation that would also provide for the details of administrative nature. Also, the objective fits into the action plan for a circular economy adopted by the EC in 2015 as a result of the EU's commitment to the SDGs. (EC, 2015). The Commission regards the concept of a circular economy as essential in its striving towards the realization of the UN SDGs.

While different in the composition of their membership, but also regarding their legal instruments, the OECD and the EU have set up a framework of co-operation which involves the participation of their member states. By this means the European Union Water Initiative (EUWI) has been created by the EU with the aim of strengthening the UN MDGs and SDGs regarding water in developing countries (EC, 2003). The OECD is an implementing partner of the EUWI in the region of Eastern Europe, the Caucasus and Central Asia (EECCA). The OECD helps with the following topics by providing its instruments: transparency of decision-making, coordination across government institutions, coordination of international organizations and donors, resilience to political change and implementation of EU water policy related principles in the EECCA region.

In conclusion, the EU provides the most legally binding regulations of all international organizations, facilitating using its institutional mechanisms their implementation. EU regulations regarding the treatment of wastewater and it's reuse as part of circular economy is a target to which the Union has committed itself by assuming the SDGs adopted by the UN. Member states are directly able to implement these regulations within the Union's framework, while

third states can also benefit by means of the EUWI. Here they are also assisted by the OECD.

III. DATA AND METHODOLOGY

1. Data and general statistics

We use OECD statistics for 28 countries for the period 2000 to 2017. This period allows us to obtain the largest number of observations, given that for the period before 2000, only for few countries we find data for wastewater treatment. The dependent variable is represented by the percentage of total population acceding to wastewater treatment (wwtt) and by the percentage of urban population acceding to wastewater treatment, for robustness purpose (wwtu). The explanatory variables are the GDP per capita in natural log (lngdp), the gross domestic expenditure on research and development, as a proxy for the access to technology (gerd) and the energy price dynamics (energy).

The general statistics and the panel unit root tests are presented in Table 1.

Table 1: Descriptive statistics and panel unit root tests

	wwtt	**wwtu**	**lngdp**	**gerd**	**energy**
General statistics					
Mean	77.46	87.43	10.32	1.721	4.785
Std. Dev.	17.26	14.05	0.423	1.014	8.596
Min	21.00	26.00	9.300	0.310	-14.90
Max	100.0	100.0	11.40	4.550	92.20
Panel unit root tests					
LLC test t*	-5.283 (0.000)	-11.84 (0.000)	-4.372 (0.000)	-0.993 (0.160)	-8.927 (0.000)
Fisher ADF P	137.5 (0.000)	196.5 (0.000)	48.16 (0.762)	33.08 (0.993)	329.2 (0.000)
Notes: (i) for both panel unit root tests the null is the presence of unit roots; (ii) p-values in brackets.					

Table 2: Main results (wwtt)

	Pooled OLS	**Fixed effects**	**Random effects**
c	-108.6*** [16.67]	-36.67 [34.05]	-58.37* [30.07]
lngdp	17.09*** [1.655]	11.18*** [3.257]	13.00*** [2.895]
gerd	4.258*** [0.672]	2.361** [1.198]	2.927*** [1.086]
energy	-0.304*** [0.094]	-0.146*** [0.045]	-0.146*** [0.045]
EU dummy	1.713 [1.285]	-	2.281 [4.998]
R^2	0.463	0.491	0.456
Hausman (recommended)		chi2 = 5.700 (random effects)	
Breusch-Pagan (recommended)		chibar2=2743.5*** (random effects)	
Notes: (i) ***,**,* means significance at 99%, 95% and 90% significance level; (ii) year dummy variable are used for all three specifications; (iii) standard errors in squared brackets; (iv) for the fixed effect model the EU dummy variables is omitted because of collinearity.			

Table 1 shows that the minimum percentage for the overall access to wastewater treatment is 21%, recorded in Chile in 2000. At the same time, the access to wastewater treatment (wwtt) enregisters the highest standard deviation, which signalize the presence of a time trend in the series. We also notice that the panel unit root tests indicate that our series are stationary (an exception is recorded for the gross domestic expenditure on research and development series, result confirmed by both tests).

2. Empirical approach

To analyze the determinants of population percentage connected to wastewater treatment services, we first resort to a simple pooled OLS estimation:

$$Y_{i,t}=\beta_0+\beta_1 X_{i,t}+\varepsilon_{i,t} \quad (1)$$

where: Yit is the dependent variable (wwtt, wwtu); Xit represents the vector of explanatory variables (lngdp, gerd, energy, and the EU dummy variable); β0 is the intercept; εi,t is the error term.

Second, to deal with the omitted variable bias and to consider country-specific effects, we use a fixed effect model:

$$Y_{i,t}=\beta_0+\beta_1 X_{i,t}+\alpha_i+\varepsilon_{i,t} \quad (2)$$

where: αi represents all the stable characteristics of countries.

Third, we run a random effect model to control for all stable covariates:

$$Y_{i,t}=\beta_0+\beta_1 X_{i,t}+\alpha_i+\mu_{i,t}+\varepsilon_{i,t} \quad (3)$$

where: μ represents between-entity errors; εi,t is the within-entity error.

We chose between a fixed effect and a random effect specification based on a Hausman test. However, to see if the random specification is recommended over the pooled OLS regression, we rely on the Breusch-Pagan Lagrangian multiplier test, which indicates the presence of random effects.

IV. EMPIRICAL FINDINGS

1. Main results

Table 2 presents the main findings of the empirical analysis, considering the entire population of selected countries. First, we notice that the influence of the economic development level is significant and very high. Consequently, the access to wastewater treatment services considerably increases with the level of GDP per capita. Second, R&D expenditure in GDP, used a proxy for the technological development, also plays a positive and significant role in enhancing the access to wastewater treatment services. The energy prices have a negative and significant impact on the wastewater treatment and expected. However, although this result is confirmed by all three specification, the effect seems to be marginal compared with that of economic and technological development. Finally, the coefficient of the dummy variable that takes value 1 if a country is an EU member and 0 otherwise, although positive as expected, is not significant. The post-estimation tests indicate the presence of random effects (the Breusch-Pagan test), whereas the random effects model dominates the fixed effects model (the Hausman test). Consequently, the random effect model better describes the analyzed relationship.

2. Robustness analysis

In our robustness check analysis, we focus on the access to wastewater treatment for the urban population only. Table 3 presents the new findings. Like the previous analysis, we observe that the influence of the economic development level (lngdp) is positive, significant and very important for the access to wastewater treatment services for the urban population in the 28-OECD analyzed countries. While the impact of the R&D expenditure (gerd) is positive and significant, the inflation recorded by energy prices has a negative influence, confirming thus the main results of the analysis. We also notice that for the pooled OLS specification, the EU membership has a positive and significant impact on the access rate to wastewater treatment services. However, this result is not confirmed by the fixed and random effects models. Moreover, as in the previous case (Table 2), the Hausman and Breusch-Pagan tests recommend the random effects specification, whereas the explanatory power of the model remains a good one (R2 = 0.46).

Table 3: Robustness results (wwtu)

	Pooled OLS	**Fixed effects**	**Random effects**
c	-68.697*** [13.43]	-132.1*** [30.70]	-117.1**** [25.87]
lngdp	14.54*** [1.333]	21.10*** [2.937]	19.34*** [2.502]
gerd	1.989*** [0.541]	1.840* [1.080]	1.756* [0.945]
energy	-0.369*** [0.075]	-0.137*** [0.040]	-0.145*** [0.040]
EU dummy	5.767*** [1.035]	-	5.397 [3.748]
R^2	0.475	0.449	0.464
Hausman (recommended)		chi2 = 5.650 (random effects)	
Breusch-Pagan (recommended)		chibar2=2367.1*** (random effects)	
Notes: (i) ***,**,* means significance at 99%, 95% and 90% significance level; (ii) year dummy variable are used for all three specifications; (iii) standard errors in squared brackets; (iv) for the fixed effect model the EU dummy variables is omitted because of collinearity.			

V. CONCLUSIONS

The purpose of the paper was to present an overview of the regulatory framework applicable to states in the field of wastewater treatment and to investigate, using data provided by the OECD, as to how these regulations influence wastewater treatment in the field.

Our empirical analysis indicates that the economic development, but also the R&D expenditures used as a

proxy for the technological development, are the main drivers of the population access to wastewater treatment services. At the same time, the dynamics of energy prices have a negative impact on the access rate, whereas the EU membership, contrary to the expectations suggested by the compulsory character of its legislation, has no significant influence. These results are validated by all panel data specifications used in the analysis, although the random effects model is recommended by the post-estimation tests. The findings are robust if we consider the urban population only. Taking the rural population into consideration exceeds the purpose of this paper.

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Dynamics of the Cost Related to the Large-Scale Production of Automotive Components

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Abstract – Nowadays, we are aware that quality has a high price. To meet the quality level required by the client, the organization must be mindful of and understand the importance of quality costs. The idea that quality has a high price must first be considered from the point of view of the expenses with non-quality. The prime objective of this paper is to evaluate and analyze non-quality costs, establishing a procedure for collecting and assessing non-quality costs. Once the cost of non-quality is determined, the organization is given a chance to decide how to use its resources to reduce and prevent quality costs pro-actively**.**

Keywords: Cost reduction, non-quality, quality costs, evaluation of non-quality, improving non-quality costs

I. INTRODUCTION

Measuring quality through an indicator system costs time and money, but non-quality is more expensive. The consideration of quality as expensive is due to the non-measurement of the price of non-quality. Some of its consequences, especially in the large-scale production, are duplication of processes, repetition of works, correction errors, unnecessary stocks.

There are estimates that, within an organization, quality costs, including quality losses, vary between 5% and 25% of total turnover, depending on organization type and evaluation systems implemented.

Quality has a leverage effect on the organization's financial performance. Generally, if you consider:

a = profit / turnover,

b = quality assurance costs / turnover,

then the effect of reducing the costs incurred for quality assurance with an R ratio is equivalent to increasing the turnover with

$$1 + R\ (b / a) \tag{1}$$

In the past, the cost of poor quality was mainly used to measure manufacturing costs. Lately, it has been concluded that in all departments, processes, and activities they are produce costs, because things were not done right at the time. Today, we understand that any enterprise or production unit must have the basis of implementing the quality management system (SMC) to be in line with the quality standards. For implementing the SCM, a set of organizational structures, responsibilities, procedures, processes, and resources is needed. One of the favorable effects at the company level is the reduction of non-quality costs (Dumitrescu, 2017).

By applying clear procedures and evaluating the data on quality costs, the management team manages to reduce disorganization and reduce costs, focusing on increasing quality.

The costs with non-quality are a special topic, because of their correct collection and evaluation, management decisions depend on quality improvement and continuous improvement.

Defining quality costs is often difficult because (Dumitrescu, 2017):

- A series of quality costs are not measurable; these can only be estimated;
- There is a time gap between the occurrence and the identification of the failure;
- Multiple failures appear during the utilization at the final customer.

The cost of non-quality could be defined as the difference between the current cost and reduced cost if there were no errors and defects in the design, production, marketing, and use. It is possible to calculate the cost of non-quality in % of turnover (2), added value (3), and the number of employees (4):

$$I_1 = \frac{CONQ}{T}\ x\ 100 \tag{2}$$

$$I_2 = \frac{CONQ}{AV}\ x\ 100 \tag{3}$$

$$I_3 = \frac{CONQ}{NE}\ x\ 100 \tag{4}$$

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CONQ = Non-quality costs; T = Turnover; AV = Added value ; NE = number of employees

Two types of non-quality cost are defined (ASQ, 2018):

- *Internal failure costs* are costs to remedy defects that are discovered before the product or service is delivered to the customer. These costs occur when the process or work don't reach the required quality standards and are detected before they are transferred to the customer.
- *External failure costs* are costs incurred to remedy defects discovered by customers. These costs occur when products or services that fail to reach design quality standards are not detected until after transfer to the customer.
- The quality cost system, once established, should become dynamic and have a positive impact on the achievement of the organization's mission, goals, and objectives.

II. RECORDING OF NON-QUALITY COSTS – A PROCEDURE MODEL FOR USE IN AUTOMOTIVE COMPONENTS

Cost reduction is the keyword in the automotive branch because of customers requiring 0 defect strategies at minimum costs. It is important for companies to develop procedures to asses quality costs from all processes and departments involved.

For better data collection and evaluation of quality cost, a procedure was developed and implemented in the beginning of 2019, showing the different approaches of quality cost during the years.

A. Purpose

This procedure instruction defines the procedure for recording non-quality costs for cable harnesses, pursuing the following objectives:

- Transparency to costs which are charged externally, as well as costs occurred internally;
- Creating a database for evaluations / analyses which indicate that actions or decisions are needed;
- Improvement of the interface between the departments of "Finance" and "Quality", in order to accelerate the processing of conformity costs and to structure it so that it is defect-free.

B. Terms and definitions

Non-quality costs are costs which are incurred in influencing the production process or customer supply process in a preventive or reactive manner, in order to ensure conformity of the product to the requirements of the customer.

Internal defect costs are costs arising for the elimination of defects discovered before the product is delivered to the customer. These costs occur when the requirements of the customers are not met by the product: Scrap through their own fault or by multiple testing, Sorting/rework/0 fault gate, Problem investigation.

External defect costs are costs arising for the elimination of defects by customers. These costs occur when the requirements of the customers are not met by the product and are not detected until after reaching the customer: Warranty, Recall action, Product liability, Problem investigation, Sorting/rework at the customer, 0 km failures, Field failure, Logistics costs, Replacement costs/ defective parts at customer

C. Responsibilities

A responsibilities matrix for the entire organization was created, to have a clear and structured view of all departments involved and responsible for the non-quality cost. Once all departments play a role in cost reduction, quality costs are getting much more important to collect and supervise.

While departments such as Production and Quality play a key role in the occurrence and collecting of internal defect costs, which have to be reported to controlling and compared to the logistics data, the departments of Purchasing, Sales and Development are not involved, as these costs are non-quality cost, caused by internal mistakes and leading to non-conformities, as shown in Table 1.

For external defects, all departments have to be involved and collaborate. The responsible department is Quality, due to failure of preventing the defects form happening in house. Also, the quality department must collaborate with all involved department in order to prevent, appraise and detect the quality costs, as shown in Table 2.

Table 1 - Responsibilities matrix for Internal defect costs

Internal cost types / **Detailed data**	**Responsibilities by department**							
	P	**L**	**Q**	**A**	**C**	**IE**	**S**	**RD**
Scrap through own fault	R	I	C		I			
Sorting/Rework	R	I	C		I			
Scrap caused by multiple testing	R	I	C		I			
Problem investigation	C	C	R		I	C		
Zero fault gate	C		R					

RD - Development; IE - Industrial Engineering; P - Production; L - Logistics; Q - Quality; A - Purchasing; C - Controlling; S - Sales; R - responsable ; I - information ; C - collaboration

Table 2 - Responsibilities matrix for external defect costs

Internal cost types / Detailed data	Responsibilities by department							
	P	**L**	**Q**	**A**	**C**	**IE**	**S**	**RD**
Warranty/Recall actions/Product liability	C	C	R	I	C	C	C	C
Problem investigation	C	C	R			C		
Sorting/rework at customer	C	C	R		C	C		
0-Km failures	C	C	R		C	C	C	C
Logistic extra costs (shipping)		C	R					
Replacement costs/defective parts at customer	C	C	R					

D. Recording of costs

Internal defect costs must be recorded daily in the quality sheets and then put in the monthly report. Cost such as sorting/rework and 0 fault gates are reported daily in the company, so all departments should react for decreasing these costs, meaning the work for sorting/rework and 0 fault gates should be done right to avoid generating more cost. Costs such as "problem investigation" are reported monthly by calculating the hours spend by the quality team to analyze internal issues. Scrapping cost is determined monthly together with the Logistics department.

External defect costs are reported monthly, after the quality team analyses. The process should be performed pro-actively in the sub-steps of a complaint investigation, complaint processing, and invoice control.

Finally, the report goes to the Finance department and the Management, so they can set priorities based on the data. Documentation and records for this procedure are quality-related costs sheets and annual Quality Cost Reporting.

E. Dynamics of quality costs applying the procedure

Before applying the procedure, analysis of data collection and evaluation shows a clear gap between Quality records and financial records. Quality cost is recorded only over sorting and rework sheets, according to daily records of operators and quality officer, while financial data, such as claims, are recorded without further investigation or sorting costs, as shown in Figure 1.

Fig. 1. Q Costs Recording 2018 (company internal documentation)

Recording of quality-related costs

Year 2018

Company X
Project:X.23

Quality costs	Month												
Internal Failure Costs	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Costs**
Scrap through own Fault	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00 €
Scrap by max. 3 x electrical check	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Sorting / Rework	1.356,57	811,63	1.269,57	1.252,55	1.137,44	717,01	765,34	123,76	1.576,76	1.897,90	876,23	587,12	12.371,88
Problem Investigation	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00 €
Total internal	1.356,57 €	811,63 €	1.269,57 €	1.252,55 €	1.137,44 €	717,01 €	765,34 €	123,76 €	1.576,76 €	1.897,90 €	876,23 €	587,12 €	12.371,88 €
External Failure Costs	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Costs**
Warranty	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00 €
Product Recall	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00 €
Product Liability	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00 €
Problem Investigation	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00 €
Sorting / Rework at Customer	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00 €
0-km-defectives / Recall	3.307,08	6.563,63	0,00	0,00	2.419,73	545,90	0,00	0,00	4.305,00	0,00	0,00	0,00	17.141,34 €
External costs recharged	382,40	219,65	0,00	0,00	84,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	686,05 €
Total external	2.924,68 €	6.343,98 €	0,00 €	0,00 €	2.335,73 €	545,90 €	0,00 €	0,00 €	4.305,00 €	0,00 €	0,00 €	0,00 €	16.455,29 €
Total	4.281,25 €	7.155,61 €	1.269,57 €	1.252,55 €	3.473,17 €	1.262,91 €	765,34 €	123,76 €	5.881,76 €	1.897,90 €	876,23 €	587,12 €	28.827,17 €

As internal failure costs, there is no evidence of scarping harnesses (showing a clear gap between Quality and Logistics) or investigating problems. Once recorded, these costs will increase the total costs of internal failures, showing a real quality status and allowing further analysis and improvements. Figure 1 shows the improvements brought by the procedure in recording costs. As in 2018 only Sorting and rework costs were recorded, the first 6 months of 2019 show new record on Scrapped harnesses and problem investigation.

F. Reducing methods of non-quality costs

After introducing the procedure model as a defined way of calculating and assessing quality cost, in the first six months of the year 2019, the organization

could see following important data to determine how to use its resources to reduce and prevent quality costs pro-actively.

1. Cost generated by scrapping harnesses is an important cost and must be reduced: is 16% of the total cost for internal failures. As a method of cost reduction, it is important that the organization is analyzing the processes and failures that lead to scrapping a harness. Implementing corrective measures and improving process operation could eliminate this cos.
2. Investigation of problems is strictly related to generated sorting and rework cost. This is 6,3 % of the total cost for internal failures. By introducing a Pareto Analysis by a defect and working on eliminating the top 5-rework/sorting problems, the investigation costs are further reduced.
3. Problem investigation 6,4 % and sorting/rework costs 10,5% for external costs is also an important cost to collect and asses. Setting a target in first response analyses reduces sorting and rework costs at the customers, by establishing the parts affected in the first 24 hours from receipt of the complaint. Thus, problem investigation costs will also decrease by not having repetitive failures to analyze. Reacting in time and spend resources on preventive measures is the right way to reduce costs and, thereby, external failures.

Once the cost of non- quality is determined, the organization is given a chance to determine how to use its resources to reduce and prevent quality costs pro-actively. This methodology allows a better panning and investing in quality.

III. CONCLUSION

The cost of non-quality is a key indicator for the organization and should be threated accordingly. It gives the organization valuable information about the risks and opportunities to improve products and, if necessary, methods are applied it determines the opportunities to improve processes. After evaluating the non-quality costs, the organization is aware of managing quality by implementing processes of continuous improvement.

Finally, the most efficient and productive investment would be prevention. Although the prevention costs are high in the implementation phase, the results are key element of quality management.

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Environmental Protection. A Debate on Economic Aspects

Dan DURAN[1]

Abstract – The concept of sustainable development has emerged to correlate the need to continue increasing the level of human and increasingly fragile "health" level of environment. At the industrial level, things have moved more quickly. Thus, many companies use waste as fuel, and in some localities, they are trying to implement systems for heating cottage on the combustion of waste. They are first to have acknowledged the eco-economic importance of recovery and reuse waste. Researchers draw attention to the conflict between industrial civilization and environment and mention two aspects: the tendency of depletion of natural energy resources, raw materials and food or renewable consumption on a pace above their capacity of regeneration and physical damage and pollution of the environment: water, air and land. All efforts for avoiding pollution or to protect the remaining resources quantify the money spent by the private and public sector. There should be a directly relationship between expenditure and the environment "health" state. The involvement tendency of increasingly amounts for environmental protection should create cleaner and less polluted environment.

Keywords: Sustainable development, expenditure, environmental protection, cost, investment

I. INTRODUCTION - SUSTAINABLE DEVELOPMENT AND THE ENVIRONMENTAL PROTECTION EXPENDITURE

In the present time, we assist to a great intensification of the production and services activities to enhance life quality, as a demand of the increasing population. These have led to an intensive industrial exploitation of resources and continual environmental degradation. Sustainable development is a concept that aims and tries to find a stable theoretical framework for taking decisions in any situation in which there is a man / environment report type. It is known that sustainable development was originally meant to be a solution to the ecological crisis caused by intense industrial exploitation of resources and continual environmental degradation and primarily seeks to preserve the environment quality (Holden et al., 2014; Broman & Robèrt, 2017).

In 1972, the Conference on Environment held in Stockholm placed seriously for the first time the problem of damaged environment after human activities, which endanger the future of mankind itself. In 1983, World Commission on Environment and Development (WCED) begins its work, led by Gro Bruntland, after a resolution adopted by the United Nations General Assembly. In 1986, a year after the catastrophe at Chernobyl, appeared the so-called Brundtland Report, of WCED, entitled "Our Common Future" that gave the most quoted definition of sustainable development: "Sustainable development is the one that follows the present needs without compromising the ability of future generations to meet their needs". At the same time, the report admitted that economic development could not be stopped, but that strategies should be changed so that they match the ecological limits offered by the environment and the planet resources (Borowy, 2013; Broman & Robèrt, 2017).

The concept of sustainable development was imposed in the summer of 1992, after the Conference on Environment and Development of "Earth Summit", organized by the United Nations in Rio de Janeiro. During this conference there has been discussions related to the fact that human activities are dependent on the environment and resources. After the meeting, there were adopted several conventions relating to climate changes (reducing emissions of methane and carbon dioxide), biological diversity (species conservation) and halting the massive deforestation. Periodical meetings are carried out to see the effects of programs protecting the environment and to find new solutions to problems that have been omit, therefore programs and strategies are developed (Broman & Robèrt, 2017).

At the national level, Romanian Government approved the National Strategy for Sustainable Development for a two-step period 2013-2020-2030 (National Strategy for Sustainable Development of Romania Horizons 2013-2020-2030). The document follows methodological prescriptions of the European Commission and is a joint project of the executive,

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through the Ministry of Environment and Sustainable Development, and the United Nations Development Programme, through the National Center for Sustainable Development. National Strategy of Romania in the field is based on the European Union Strategy for Sustainable Development and is intended as a catalyst for those who develop public policy. It has as a purpose the changing of behavior in European society and in Romanian society and the active involvement of decision makers, public and private, and citizens in developing, implementing and monitoring the objectives of sustainable development.

Among the four key objectives of European sustainable development strategy is the environment protection, with measures to enable dissociation of economic growth by the negative impact on the environment. Sustainable development strategy and the objectives of protecting the environment is achieved through substantial efforts. These efforts made by public and private authorities are materialized in the total expenditure at the national level. These include investments and current internal expenditure (costs made by the staff of the unit). Of the total expenditures are excluded the external current expenditures, which represent expenses to purchase the service of environmental protection from third parties and the payable fees with environment title (aligned with the statements of (Broman & Robèrt, 2017; Thacker et al., 2019; Schroeder et al., 2019).

II. ANALYSIS OF DEVELOPMENT EFFORTS TO PROTECT THE ENVIRONMENT

A. A brief analysis of the investments and expenditures for environment protection in Romania

The environment should be protected by all persons of a mass. But the public administration and specialized producers should be forced to protect and to impose a conduct in the environment field. Thus, in Tables 1, 2 and 3 can be seen the efforts made by them.

Table 1. Expenses for environmental protection in 2018 (kLei)

Sector	Total expenditures	From which			
		Investments	Current expenses		Transfer
			intern	extern	
Unspecialized manufacturers	**6,953,322**	**1,657,409**	**1,947,580**	**3,348,333**	**-**
Silviculture, forest exploitation and annex services	270,720	2,587	135,284	132,849	-
Extracting industry	1,569,569	855,702	458,478	255,389	-
Manufacturing industry	1,367,959	123,934	504,379	739,646	-
Production and supply of electricity and heat, gas and hot water	2,195,952	254,361	62,174	1,879,417	-
Water capture, treatment and distribution	1,115,525	261,596	700,051	153,878	-
Constructions	144,852	11,149	49,966	83,737	-
Transport	259,281	145,462	17,161	96,658	-
Other activities*	29,464	2,618	20,087	6,759	
Specialized manufacturers	**6,732,430**	**400,913**	**4,833,490**	**1,498,027**	**-**
Public administration	**7,180,500**	**1,434,900**	**1,147,962**	**1,356,038**	**3,241,600**

**) Architectural and engineering activities; technical testing and analysis activities, research and development, other professional, scientific and technical activities*

Source: National Institute of Statistics, http://www.insse.ro/cms/sites/default/files/com_presa/com_pdf/prot_mediu2018r.pdf

Table 2. Investments for environmental protection by environmental areas and producer categories in 2018 (kLei)

Environmental domains	Total	Unspecialized manufacturers	Specialized manufacturers	Public administration
Air protection	907,162	895,974	3,454	7,734
Water protection	1,398,758	298,423	9,435	1,090,900
Waste management	767,975	90,479	386,796	290,700
Soil and groundwater protection	177,767	173,882	62,00	3,823
Protection of natural resources and biodiversity conservation	13,217	13,105	12,00	100,00
Other environmental areas *	228,343	185,546	1,154	41,643

**) Other environmental areas = Noise and vibration reduction + radiation protection + Environmental research and development + other environmental activities*

Source: National Institute of Statistics, http://www.insse.ro/cms/sites/default/files/com_presa/com_pdf/prot_mediu2018r.pdf

Table 3. Expenditure on environmental protection by environmental areas and categories of producers at national level in 2018 (kLei)

Environmental domains	Total	Unspecialized manufacturers	Specialized manufacturers	Public administration
Air protection	2,385,265	1,083,325	130,170	1,171,770
Wastewater management	2,392,460	1,056,911	77,580	1,257,969
Waste management	6,463,040	404,714	5,010,188	1,048,138
Soil and groundwater protection	502,783	408,108	3,941	90,734
Protection of natural resources and biodiversity conservation	176,420	172,992	2,143	1,285
Other environmental areas *	2,743,886	478,939	10,381	2,254,566

**) Other environmental areas = Noise and vibration reduction + radiation protection + Environmental research and development + other environmental activities*

Source: National Institute of Statistics, http://www.insse.ro/cms/sites/default/files/com_presa/com_pdf/prot_mediu2018r.pdf

Table 3. Environmental protection expenditure account by economics characteristics and by environmental domains (millions of Lei)

Categories of producers	Economics characteristics	Environmental domains	Years			
			2014	2015	2016	2017
General government	Total environmental protection output	Total	2416.14	2556.8	2097.7	2710.29
	Environmental protection market output	Total	256.23	53.19	91.61	151.98
	Environmental protection non-market output	Total	2159.91	2503.61	2006.09	2558.32
Specialized manufacturers	Total environmental protection output	Total	4847.28	5098.99	5069.85	5259.67
	Environmental protection market output	Total	4105.71	4267.02	4336.08	4453.46
	Environmental protection non-market output	Total	741.57	831.97	733.76	806.21
Nonspecialized manufacturers secondary environmental protection output	Total environmental protection output	Total	1457.76	2173.74	453.49	783.31
	Environmental protection market output	Total	1457.76	2173.74	453.49	783.31
Nonspecialized manufacturers with ancillary environmental protection output	Total environmental protection output	Total	2760.8	2898.13	3865.37	4735.54

Source: National Institute of Statistics http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table

As seen from the data presented in Table 1 the expenditures for environmental protection at national level were about 14.7 billion lei) representing about 1.6% of GDP). At national level, the highest expenditures for environmental protection were recorded in the waste field by specialized producers, representing 77.5% of the total waste expenditures. At national level, the largest investments for environmental protection were registered in the field of wastewater management in the public administration, representing 78.0% of the total investments in the field of wastewater management.

Furthermore, the data in Table 2 show that at the national level, the share of investments of non-specialized producers accounted for 47.4% of the total investments for environmental protection, followed by those of public administration investments (41.1%) and the investments of specialized producers (11.5%). Out of the expenses for environmental protection of the non-specialized producers in the field

of "production and supply of electricity and heat, gas and hot water", 31.6% were registered, while in the "extractive industry" sector 22.6 were realized %, and the "manufacturing industry" sector spent 19.7%.

The centralized date in Table 3 show that on environmental domains, the highest expenditures were recorded for waste management (44.1% of total expenditures for environmental protection at national level), followed by expenditures for other environmental domains (18.7%) and expenses for management wastewater and air protection with 16.3%. A general overview of the environmental protection expenditure account by economics characteristics and by environmental domains is presented in Table 4 as a dynamic analysis for the period 2014 – 2018. In generally, at the national level there have been supported the environment protection constantly (less decreasing of the expenditures and more constant and increasing values of the analyzed indicators have been identified.

B. Economic sustainable development indicators in Europe

As seen in Figure 1, total general government expenditures on environment protection (for 2017, available data on Euroststst) depends on each country GDP. Countries that have expended more that the EU-28 average value are: Belgium, Czech Republic, Spain, France, Italy, Malta, the Nederland and Norway.

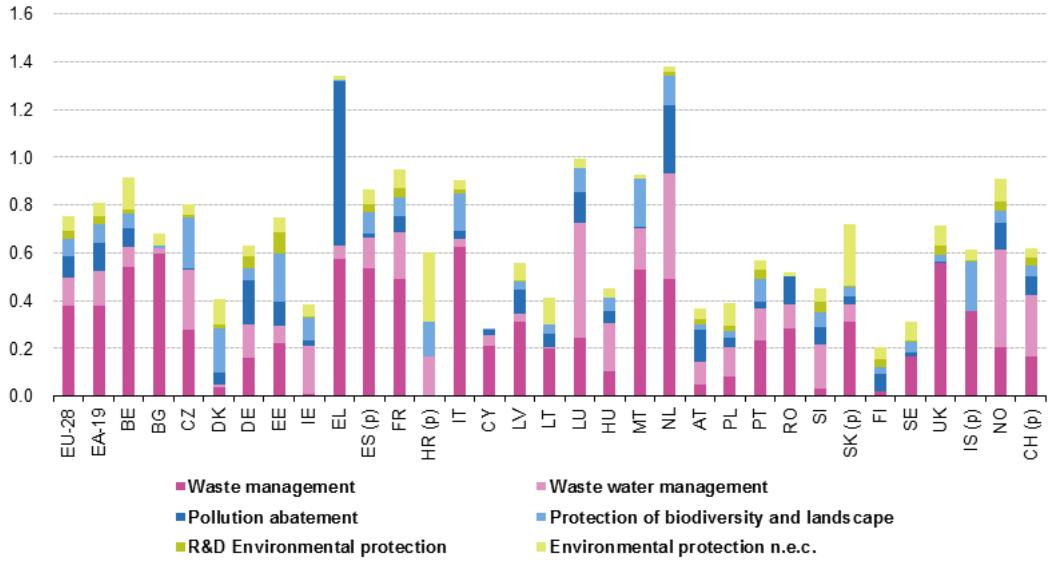

Fig. 1. Total general government expenditures on environment protection, 2017 (% of GDP)
Source: EUROSTAR, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Total_general_government_expenditure_on_environmental_protection,_2017_(%25_of_GDP).png

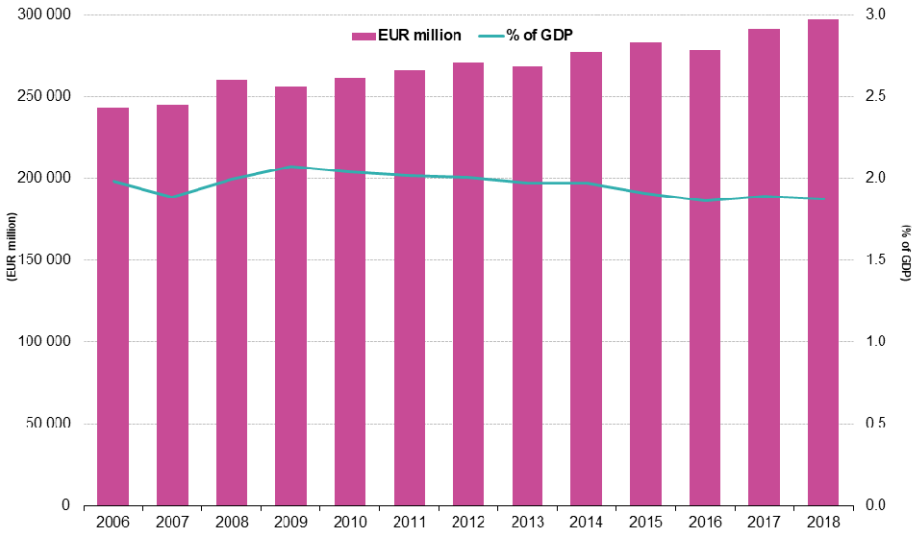

Fig. 2. National expenditure on environment protection, EU-20, 2006 - 2018
Source: Data for EU are estimated by Eurostat, online data codes: env_ac_pepsgg, env_ac_pepssp, env_ac_pepsnsp, env_ac_eptrf, env_ac_epneec and nama_10_gdp

Globally, Figure 2 presents results of the 2018 data collection on environmental protection expenditure accounts (EPEA) provided by European Union (EU) Member States with reporting obligation (Cyprus was

granted a derogation) and selected non-EU countries. It provides information on the EU's expenditure on prevention, reduction and elimination of pollution or any other degradation of the environment and covers the total spending by a country (i.e. by its households, businesses and government) on environmental protection services, e.g. waste and wastewater management, protection of biodiversity, as well as protection of soil, research and development, education and training. In 2018, the EU Member States spent EUR 297 billion on environmental protection, which amounted to 1.9 % of gross domestic product (GDP). Purchases of environmental services by households and by government, and investments made by producers of environmental services, and by corporations to reduce environmental impacts of their activities, accounted for nearly two thirds of the spending (61 %). Detailed information on composition of national expenditure on environmental protection (NEEP), on contributions to NEEP of different sectors and shares of various transactions is provided in the first three sections of this article. The environmental services are produced both by private corporations and by government. The share of each sector in the total output of environmental services depends on national arrangements and varies across EU Member States.

As can be seen in Figure 2, in 2018, national expenditure on environmental protection (NEEP) of the EU Member States amounted to €297 billion. Rising on average by nearly 2% each year, NEEP has increased by 22% since 2006. As a percentage of gross domestic product (GDP), expenditure on environmental protection remained relatively stable between 2006 (2.0%) and 2018 (1.9%). A small increase was observed in 2009 (2.1%), mainly due to GDP contracting during the financial crisis and economic recession. However, the EU Member States' spending on environmental protection has remained lower than households' expenditure on alcoholic beverages, tobacco and narcotics in the EU, which ranged from 2.3% to 2.1% between 2006 and 2017. Corporations' spending accounts for the largest share of the environmental protection expenditure, accounting for 54% of the total in 2018. The expenditure of general government and non-profit institutions serving households (NPISH) stood at 24%, while households accounted for 22% of the total NEEP in 2018.

III. CONCLUSIONS

According to the Environmental Implementation Review (2019) at the European Union level, there have been identified a few root problems that require special attention in the coming years and has raised the attention of key authorities and citizens to environmental implementation gaps in their countries. These ideas are aligned with the article findings in report with the presented indicators of sustainable development expenditures and investments.

Integration of environmental objectives with other legitimate policy goals is often weak and this has negative effects on implementation. Better integration of all these objectives at the stages of policy planning and implementation is essential for the success of each of the relevant policy areas and ultimately for our societies. The perspectives indicated by the latest State of the Environment report (2015) and the Environmental Indicator Report 2018 are rather grim and full implementation of the current EU environmental laws is, indeed, merely a starting point in changing the trends.

Statistical data and the analysis development have proved that the current progress in real implementation is too slow and better environmental integration can be a game-changer. The situation can be improved only if the environmental concerns are taken into consideration in the framing and execution of public policies with a significant environmental footprint, such as energy, transport and agriculture. In addition, the "nexus approach" could be strengthened as a guiding principle: it is about examining issues systematically and in advance, with a view to identify further integrated solutions for the involved sectors and to underpin environment-related investments at EU, national, regional and local level (according to the (European Commission, 2016)).

The quality of the relevant governance systems is a key catalyzer for full implementation. While the needs differ from one country/system to another, there cannot be any improvement in this respect without securing the necessary human and financial resources to the relevant administrations. Further, sustainable development's targets implementation cuts across and depends on the active engagement of a wide spectrum of stakeholders, public and private, from decision makers to citizens, businesses and industries. Such a wide range of interested parties can be activated only if the relevant information is made available to them in an effective way. *Transparency of environmentally relevant information* goes beyond the legal obligations: it is a precondition for effective collaboration in environmental implementation. Without transparency, trust disappears, and the mobilization of stakeholders is not successful.

Tackling the implementation gaps requires solid evidence to identify the 'distance to target', the underlying difficulties and available options and then to monitor the effectiveness of the chosen solutions. Therefore, there is a strength need for all EU countries to be transparent when implementing EU rules and policies, building on the EU's open data porta (https://data.europa.eu/euodp/en/home), and using modern information technologies for communication, data and information purposes. In addition, these will enable the right tailoring support to the realities on the ground, when expenditures and investments are planned.

According to actual policies of EU, countries are supported to improve their sustainable development

indicators (reflected in the country report). Several initiatives have been encouraged as following:

- Expressions of this are the thematic Environmental Implementation Review dialogues and the dedicated Peer 2 Peer tool helping to assess the problems, exchanging good practice and peer learning. Successful country dialogues require active engagement of regional and local authorities and of other stakeholders;
- There is a need for more thematic debates at and between all levels of administration, which should result in operational conclusions followed by action. The debates should take into consideration possible further environmental integration in other policy areas.

In addition, the European Commission has published documents that can serve as a starting point, including the Communication on Clean Air (European Commission, 2018a), the Working Document on agriculture and water (published in 2017), the Action Plan for nature, people and the economy, and the Early warning reports on the re-use/recycling of waste (European Commission, 2018b).

The paper underline that EU countries and their governments should act on the sustainable development aspects and related indicators more actively. Countries are also encouraged to continue working on the implementation of the environmental rules in place to deliver better environmental outcomes to the citizens, to protect their health and to cushion and offset the environmental pressures that are costly for our societies and economies.

A good environment is a common asset of people of the EU, both present and future generations, and it constitutes a critical foundation for the other social and economic activities. The EU has put in place comprehensive environmental legislation, with the aim of making sure that air is breathable, water is safe to use, our food is healthy to consume, things around us are safe to use, and pollution is kept at bay. These standards are as good as their implementation. Making implementation happen is in our hands, whether we act in a public or private capacity (Schroeder et al., 2019).

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Employment Interview - A Management Perspective on the Methodology Applied. Classic vs. Digital: Candidate's Perspective

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Abstract – Is the organization ready for the future? The recruitment and selection of human resources through social media is a natural trend, necessary, and continually changing. This research is based on candidates experiences - who have already participated in "digital" interviews applying through online platforms, and all their answers prove once again that anything new - in our case, digitizing human resource (HR) processes, requires a period of adaptation from all involved - organization, managers or applicants (candidates). The candidates are prepared and understand very well what is happening now in HR and see the transformations of the HR area in recent years. There is a clear intention to be more flexible and to assimilate these transformations in HR more quickly and easily, but in many cases, some necessary skills are missing for example: to access online solutions – an aspect that intervenes and slows down the process of adaptation to modern interviewing solutions for some candidates. Attention will be focused on the management of innovation, strategic management, and most relevant in our days, change management.

Keywords: professional career, human resources (HR), management, digitization, candidate, interview

I. INTRODUCTION

This paper seeks to highlight the impact of the "digital era" in the recruitment process – with an emphasis on the interview area. The case study focuses on what is the interview and its forms, closely following the opinion of the respondents from a traditional or modern perspective of presenting to a job interview. The paper aims to show the efficiency of recruitment through online channels, and also, it follows the current perception of the way an interview is managed: recruitment in traditional/classical form (face to face) or digital (phone interview, video interview).

The objective of this research is focused on the experiences of candidates - who have experienced a recruitment process before, applying for a vacant job with the help of online platforms and who have participated in "digital" interviews. Following the retained opinions on the proposed theme but considering the response received following the completion of the questionnaire, several ideas are defined. Those ideas generate various ways to improve the process and selection carried out with the support of digital applications and firstly, the need to identify and assume new concepts to be applied and tailored to the expectations of the candidates. Transformation into HR has begun, now we need to adapt to the new trend.

Artificial Intelligence (AI) proves to be useful in its use at the level of the selection and recruitment process only if it always is accompanied by the human component. It must say that the human component is never canceled in this process, its implementation does not diminish the importance of the "human" role, but it repositions and compels it to transform or better said, to adapt to the new trend on the market.

Digital era also puts its mark in the HR (human resources) department, and all those who work in this field must be contributors to digital transformation. Only in this way the transformation will generate more straightforward flows and start actions faster and effective, including the process of identifying and selecting candidates, the interview area, or the preparation of the necessary documents in the employment process. Before this period, recruitment in the traditional style was considered the optimum solution. Of course, we can no longer support this assertion taking in view the impact of digitization. The digitization has simplified both the identification of vacant posts – using a simple laptop-type device, tablet and even a phone, an Internet connection - as well as the employer finding the ideal candidate by merely posting an announcement and saving time, with low impact on the company's financial budget [1; 9; 10; 11].

Of course, in this study was anticipated that respondents from younger generations would be extremely open to digital, but they are only a part of the candidates who present themselves to interviews and " the future "must be embraced by "all the candidates in

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the market" or at least understood. In order to capture as best as possible what is happening in the environment of the Romanian financial-banking system, this paper tries to include the candidates who today also have the status of the employee and to have a more or less balanced distribution on the age of those who responded to this survey. There are some generations opened to "the new" and would like to have an online interview but do not have the expertise in the IT area, required for an interview of this type. They do not use voice or video applications, how to make the necessary connections to prepare these meetings or have equipment tailored to such technical solutions.

A study was prepared and conducted in which 202 employees from multinationals in Romania have responded to a series of questions focused on the financial-banking sector - providing personal feedback on the perception of what the online interview represents/means for them and how they react when they are invited to take part in an interview in the digital area vs. traditional method. The research presented below addresses structured recruitment theme in both classic and modern (online) system and selection of private resources from a dual perspective, both by using the methodology now known as classical recruitment methods and selection, as well as, by using new methods of recruitment and selection, perfectly combining traditionalism with modernism. The traditional interview will be assimilated to the classic method of participating in an interview, and modern is the online interview: telephone, video (Skype) or assisted by artificial intelligence [7; 8; 9].

II. LITERATURE REVIEW ON "DIGITAL AGE" AND THE IMPACT OF DIGITIZATION IN THE RECRUITMENT PROCESS

In the last period we read about the digitated influence on work in general and how artificial intelligence will influence the disappearance of some jobs - which can be replaced by robots (including the software area here), but for now we have a significant positive impact on the development of new jobs only in the IT field (Information Technology field). Slowly, more and more IT solutions are emerging and integrating into other areas of activity, and probably many jobs known today will be in full transformation [3; 4].

In the author's opinion, there must always be a balance: the digital zone must provide the human side of the recruitment process, the resources necessary to identify the "optimum candidate". The human feeling of the manager remains essential in validating recruitment. We have a lot of analyses/studies carried out in this segment and are looking for more and more opportunities to "digitalize" processes in the HR area [1; 7; 8; 9]. Human resources do not necessarily mean recruitment from the perspective of the interview, but we find here a series of complex processes requiring digital interventions: CV (Curriculum Vitae) databases, preparation, and transmission of employment offers, databases with remuneration or other data about candidates/employees, personalized offers for their employees. These are just a few processes where the digitate can bring additional immediate and welcome value [7]. For the company, the presence of artificial intelligence presents as a great accomplishment, which is not assumed in the same way by candidates or employees, who imagine that their posts will eventually be abolished. However, it must always consider that "everything transforms – perhaps today it disappears an activity, but next to it creates new ones defining the future. Of course, there are unfortunately some negative aspects of digitalization: most companies do not have at the level of top management "expertise in developing a digital business model" [2] and unfortunately, all sorts of solutions implemented by others are taken without considering whether such a digital solution fits the culture of the company.

Digital recruitment will continuously develop in the future and with the involvement of artificial intelligence, will attract more complex aspects: much better-analyzed data flow so that the company facilitates employment in more cases [5; 6; 7; 11].

III. RECRUITMENT, SELECTION, AND INTERVIEWING OF CANDIDATES - TRADITIONAL CONCEPTUAL APPROACHES VS. MODERN

Recruitment is the initial part of the process of filling a vacancy job and includes a close analysis of the job and the requirements required to fill this position, in order to find the most suitable source of candidates and how they can subscribe in the recruitment process with the ultimate goal of recruiting the best candidate for the company. "Recruitment is the activity undertaken by the human resources department and consists in the process of identifying the persons who have the required characteristics and satisfy certain conditions for filling a position, as well as attracting them in order to participate in the subsequent selection process" [2].

A sophisticated recruitment and selection process consist of the following steps:

- Defining the job requirements;
- Attracting candidates;
- Evaluation of applications (submitted by candidate);
- Interview support (online or traditional);
- Testing, evaluation of candidates following interviews;
- Obtaining additional references (traditionally based on references or data collected);
- Offering candidates;
- Initiating and monitoring their evolution within the company.

A. Defining the requirements

This captures the definition of the details needed to fill a vacancy and the conditions that must meet to be able to face the challenges encountered in that position.

The main specifications of the job (details on job description) are:

- The number of activities performed and in what time frame;
- The responsibilities of the job;
- The unique environmental conditions in which they work and the risks that may arise;
- Performance bonuses, career opportunities, various benefits offered by the employer;
- The need to travel in the interest of service or to work over the program;
- The size of the coordinated teams (for the manager).

The conditions that a candidate must meet are related mainly to his knowledge, skills, and abilities [3] that she/he must have, to meet the job requirements, as: skills, abilities, qualities, or specializations. These should be verified during the interview, and of course, some may be eliminatory in the process [5; 6; 7].

analysis that should cover aspects such as the national or local reputation of the organization, the remuneration of the work, the benefits of the employees and the conditions of work, the safety of the job, the opportunities of development and professional training, the prospects of promotion in the future and forming a career within the company.

The candidates inside the company must be firstly considered, and in most cases, at the level of the Romanian corporations there is even established a priority - usually agreed with the union area, although the policies of some companies focus on treating them equally in comparison with those outside the company.

B. The evaluation of the applications

It is performed when the recruitment process is over; marking the connection between the recruitment process and the selection process. The selection process is based on the evaluation of the applications received, the testing of the candidates, the holding of interviews, the obtaining of references, and finally, the offer of the candidate. This evaluation always is made by specialized personnel in the HR department.

C. The interview and its role or in the selection process - traditional vs. modern

It is an essential part of the selection/recruitment process and effectively represents the application sorting process according to criteria well established by the employer. It is verified that the candidate corresponds from studies, qualifications, spoken language, or other primary requirements.

In addition, in large companies, "digitized CV screening is practiced, all CVs being scanned through software that searches each document by keywords, or items relevant to the hunted position. A new trend regarding preliminary selection methods refers to the use of data or biographical data. Bio-data type measurements are based on the principle of behavioral consistency; that is, that past behavior is the best predictor of future behavior. To gather these biodatas, experts in the field or the field of employment develop various questions to evaluate the candidate's behavior. These questions are anchored in various situations that a candidate may have encountered throughout his career or even life situations and are designed to determine his typical behavior."

D. Advantages and disadvantages of interviews

•Allows companies to present in detail what type of candidate they are looking for the vacancy, clearly specifying the qualities and aptitudes sought:

- It is the moment when an employer can ask questions to a candidate to identify a candidate's experience and expertise and if his competences correspond with the job description;
- Offers the candidate the opportunity to evaluate the organization, the interviewer and the workplace;
- It represents the moment when a candidate can request any details about the company, the vacancy, and any other details necessary to ensure an optimal decision from both perspectives. Sometimes the employer even analyzes what kind of questions are asked by the candidate and what are his main interests;
- In the case of the traditional interview, it creates the possibility to conduct a face-to-face meeting, so that the interviewer can make an assessment of how the candidate will fit in the organization, inclinations and would like to work. If we talk about an online interview, it can also support all the advantages presented above only because it requires some IT skills.

The disadvantages of the interviews are:

- Lack of a standard "unit of measure" for the objective evaluation of candidates;
- There are outstanding people in interviews, and they can mislead a recruiter - the big difference between the person who appeared during the interview and the subsequent behavior;
- "I can lead to biased and subjective judgments on the part of the interviewers" [6];
- It is based much on the experience of the recruiter - some candidates consider that they are outstanding, but things are not so. Similarly, we can agree that some candidates are doing very well during the interview, and after employment, there is a total mismatch with the company culture.

E. Details on the candidate evaluation

The evaluation of the candidates is done after the completion of the interviews and tests and consisted of the formation of a list with the best candidates - the so-called "shortlist". Selected candidates may also be

called for a second or even third session of interviews with different managers depending on the complexity of the position occupied. If we talk about a leadership position, we will have many meetings - even if some of them are formal, and only personal and relationship issues are verified.

Obtaining referrals: an essential step in the recruitment process that should be treated with interest every time. Of course, this is the best solution to get referrals from a trusted person, but it can also be requested from the candidate, who can bring letters of recommendation from former employers, business partners or teachers.

The candidate's offer is made clear when the recruitment decision is final, and after the meeting, interview and after verifying some references. The job offer includes information on the gross/net salary, benefits, work program, holidays, medical services, group or individual insurance, the duration of the contract and the probationary period.

The training and the follow-up of the new employees' evolution: the granting of support are performed almost during the trial period, but, as a rule, the employees enjoy permanent support from the human resources department and the direct management area. As a rule, performance evaluation is performed periodically by the direct supervisor. Of course, the results may become erroneous, despite the use of methods and criteria that have the role of objectifying the evaluation. The probation period differs depending on the level of expertise of the candidate, the type of position occupied (usually the management positions have a more extended trial period than the execution ones) [7; 8].

IV. CASE STUDY AND OBTAINED RESULTS - RESEARCH METHODOLOGY

The research aims to identify how the candidates feel about the differences between the traditional interview – face to face and the modern one, through online methods (video, telephone). The research wants to give a clearer picture of the candidate's readiness in terms of digital acceleration that now exists in the HR area and is increasingly felt in the recruitment process.

The main objectives pursued:

- Identify the perception of candidates on the face to face, video- or telephone interview (advantages and disadvantages)
- Identifying candidates ' preferences for how to hold an interview
- How prepared are the candidates for the digital era in HR?

The method used was the investigation by the questionnaire method, a quantitative approach to gathering information, and the questionnaire being used as a tool for the investigation. The questionnaire was conducted, adapted, and addressed to people who are currently employed and who have participated in recruitment interviews.

The questionnaire was created with Google Forms tool and distributed online on various groups of employees from different multinational companies – this questionnaire was distributed to about 450 people, and we have the opinion of 202 people (approx. 50%).

The questionnaire initially contained 24 questions and is delimited in 2 sections: Section A. GENERAL DATA comprises five questions and section B. II. The PERCEPTION OF CANDIDATES REGARDING the JOB INTERVIEW: TRADITIONAL vs. DIGITAL comprises 19 questions. The questionnaire was available from 21.03 – 01.05.2019. The data collected during the previous period was analyzed and interpreted during the period after 01.05.2019. The number of respondents was 202 people. The number of respondents may be significant, given that all questioned persons have an employee's status and the questionnaires have been submitted to service mail addresses.

Because questions are complex and the number of aspects followed is diverse, this paper will present only the results identified for each proposed question regarding the face to face interview, video interview and telephonic interview (advantages and disadvantages identified).

A. Demography and research variables

What is very important in the analysis prepared is to understand that this paper has specifically addressed the "candidate with professional experience," that have participated in various types of interview and can make the difference between the traditional approach and modern – focused today on computer tools. Secondly, the target audience for this questionnaire is precisely the candidates from an earlier generation - before generation Z (who we already know that they already embraced the digital era in HR processes)

The target audience is 74.3% mature from a professional perspective, with over five years' experience in different fields of activity. 10.9% have experienced between one and three years, 7.4% between 3 and five years and all 7.4% are newly employed less than one year in the work-field, and most people who responded to this questionnaire are women (78.2%) and only 21.8% men. Of course, the following responses and openness to the digital can also be influenced by certain behaviors related to the person responding to the questionnaire – but these influences are of psychology and are not subject to this study.

A significant factor in our analysis is the age of the people who responded to this questionnaire – as we remember earlier there was the generation Z that is totally open to the online area or generation Y that adapts to the digital era more quickly, but we want to identify the homogenous opinion of the entire current workforce and for this purpose this paper achieved a balance in terms of the number of respondents per age category: 15.8% are in the area 18-30 years, 32.7% are in the area 31-40 years, 28.7% are in the area 41-50 years and 22.8% are over 50 years of age.

Surprisingly, although some people who completed this questionnaire mentioned that they are open to online recruitment (social media) following the completion of this questionnaire the most frequently offered answer was "I deposited my CV directly to the employer (physical)" – 72 persons (35.6%). 52 people also confirmed that "they discussed directly with HR staff (direct meeting, Job fair)" and on the online segment we have only 54 answers confirming that "they applied online in external (other online environments: Best Jobs, Facebook, LinkedIn)" and 45 people who applied directly to the company's website. The use of another method (be it type recommendation or the identification of vacancies from other environments - newspaper announcements, announcements prepared by different state institutions) has 20% of the respondents – 45 responses.

In conclusion, the online method is not fully embraced, and many candidates still prefer interaction with the employer – physically – especially with the human resources area.

One of the first questions was about the preferred way of being recruited – interview face to face, or online (video/audio). 55% of respondents chose the variant "any of them – I am kind of partial to this" and there are some peoples who know both methodologies and are opened up to be recruited or to participate in an interview regardless of the method – the important thing is to be recruited. However, we have a firm answer "of course face-to-face" from approx. 30% of the candidates – those who embrace the traditional/classical recruitment method and only 15.3% of respondents who are sure that they want to be recruited directly from the social media channels. The percentage is not yet dominant but is sure that in the years to come, this method of the relationship between the employer and the candidate will develop, and this percentage will be increasingly higher.

As in any approach to the masses, people are different and perceive some aspects of things in their lives differently. To the question regarding the favorite interview: phone, video- or face to face we have a result which is perfectly balanced – 37.6% prefer video (Skype), 32.2% face to face – traditional method and 30.2% prefer the phone. The balanced result is a plus for the results of future questions as it ensures mature and weighted feedback-rich in opinions and different perceptions on the questions.

B. Traditional interview (personal)

This technique advantages are discussed in the following. For the traditional/classical method, the majority of respondents concluded that the main reason why they would opt for such an interview is "I can better understand the course of the discussion from the recruiter 's gestures" (66.3%) which means that non-verbal language is the key to participating in an interview face-to-face. 55.9% think they can use non-verbal language-specific movements, gestures whereby candidates can also transmit some information to the recruiter and think they can positively influence his opinion. 53% consider that visiting the company's headquarters and effective visualization of the workspace brings added value in the meeting and will undoubtedly influence their decision to join a company. 31.2% of respondents feel more comfortable in the interview face to face, and also have 13.9% of the who are concerned and consider an advantage the lack of need to know IT applications that allow the interaction of the employer-candidate in the modern variant of the interview process.

C. Traditional interview (personal)

The disadvantages of this technique are debated in the following. In contrast with what has been presented above, for the classic interviewing method there are some disadvantages: 53.5% consider that the biggest drawback is the "emotion" when they face a recruiter. As outlined above, these candidates understand the importance of non-verbal language in traditional methodology, but the emotion of such a meeting they perceive it as a disadvantage. 43.1% focus on time consumed and consider that at least the initial interviews "displacement" at the employer's premises is a time-consuming (perhaps if you are employed is even more difficult to take leave). 28.2% mentioned as a disadvantage the fact that "the answers must be given immediately, and this becomes an anxiety" – the aspect binds to the emotional area (the disadvantage shown above). Also, 22.3% see the investment in clothing as a disadvantage – mainly if employment is not materialized.

D. Online video interview (personal)

In the following there will be presented the advantages of this technique. For video interviews, we have the highest percentage of respondents who considered that "lack of need to travel to the employer's location" is the most significant advantage of this type of interview (76.2%). Undoubtedly the main asset of online interviews (via social media channels) is that we do not have to travel – especially in the case of distance recruitment. Some companies that identify talent between continents and this aspect has allowed the development of recruitment methods practiced by employers and opened new horizons in terms of "talent search". 29.7% appreciate the fact that "I can earn additional thinking time to give the perfect answer" and immediately followed by the percentage of respondents of 27.2% we have the area of people who have no emotions regarding this method of employer-candidate interaction. In the area of 25-26%, we have some candidates who are interested in the lack of need to purchase new clothes and those who prefer this solution because they "feel bravest at a distance". 16.8% practice this approach because they think they can also use some supporting elements during the discussion, and only 6.4% is based on the visible area and actual relationship based on the look.

E. Online video interview (personal)

This technique has some disadvantages that will be debated in the following. As disadvantages, we have some more balanced answers-most choices being generated by the reason ' it is impersonal.' A video interview is different from an interview face to face and for the great mass of the candidates this method of interviewing them deprives them of some behaviors that can only be carried out in the presence of two individuals – sure, the video interview is not as impersonal as the phone, but being closer to feeling the interview face to face I think the feeling of "impersonality" is dominant and is much better charged in this case. 36.6% of respondents think that "you need to pay more attention to the camera" and not having experience in this area, they can be effectively confused by the presence of the camera and tend to control how they actually look in the picture, if they sit right, if the hair is in place etc. forgetting to be permanently focused on the relationship with the recruiter. A percentage equal to 30.2% consider it a problem because it does not benefit from the interpretation of non-verbal communication and at the same time must always be technically prepared, approx. 25% expressly mentioning that it is a problem knowing how to use the Skype app – the essential video tool at this time.

F. Telephonic interview (personal)

In the perspective of a telephone interview, the most particularly identified advantage of the candidates is the lack of need to move to the employer's location – 71.3%. There are more and more candidates asking questions about the position for which they are called to the interview from the initial phone call – if the position and description made by the recruiter do not satisfy the candidate's interest, he effectively refuses the invitation. With 54% and 109 affirmative answers, we identify as the advantage of the phone interview the way we dress – more concretely the delayed, free aspect of the phone interview is also one of the main advantages. There is no longer a business dress-code, but rather a casual current-business – even more so in the case of the phone interview, the candidates prefer it precisely that it does not impose any rules on this. 44.1% mentioned it as a positive aspect and the fact that "a professional environment should not be created in the room where the call is answered", a clean environment brings a positive mood and undoubtedly creative. 31% appreciated the time earned to think of a better response, 20.8% consider it an advantage that they can use other "resources" to provide the best answer to the questions asked by the recruiter and only 14.4% consider advantage the fact that they are not seen by the employer not being communicative people – this aspect defines a feature of many respondents to this questionnaire: the lack of direct interaction with the recruiter is more of a disadvantage.

G. Telephonic interview (personal)

Almost 60% of the interviewed people consider that "they cannot figure out what the recruiter thinks of them" as being the most significant drawback – this aspect also belongs to the area of non-verbal communication, and they arise due to lack of elements related to the visual area In the phone interview we sit in an open and pleasant environment for us, we are comfortably dressed, we can use other resources during the discussion but we lack something fundamental – the recruiter ' s reactions to our answers (gestures, mimics, glances – signals that can guide your future responses). Over 100 people (50.5%) see the downside and the fact that after all, such an interview is impersonal – is not a face-to-face meeting. In addition, the lack of this contact can provide the employer with some important clues regarding the state of mind of the candidate and depending on this how to fold on the telephone conversation. Now, concerning the use of non-verbal language this time by the candidate, 47.5% of people have considered this aspect a disadvantage. Over 50 people surveyed have ticked as a disadvantage and the fact that they do not believe in such discussions and as usual, the essential interviews follow this first relationship employer-candidate. 23.8% stated that "it is difficult to relate to a person whom you do not see face to face". Moreover, 6.9% even consider that they look quite well physically and unfortunately cannot benefit from this advantage in a telephone interview.

Even after we have gone through the advantages and disadvantages of each type of interview together with all the people interviewed, in the conclusion identified so far, the questionnaire contained a different trap question similar to the introduction one: "If tomorrow an employer contacts you and let you choose the preferred method to hold an interview – what will you choose?" - This question wants to re-identify what the preferred method of the 202 people is who took this online questionnaire. The highest score gets the interview face to face with a percentage of 58.9% respondents, followed by the video interview (Skype) with a percentage of 22.3% and with only 18.8% we have candidates who prefer the phone interview. It is extremely clear from this question that no matter how much we currently preach the digital influence in the recruitment process, in the interview area we still have a significant percentage of candidates who prefer meeting face to face and with this approach, they actually, prefer the traditionalist method.

H. Why modern methods?

Maybe we all wonder sometimes from where has appeared the need for digital involvement in the process of recruitment? Human resources do not exactly mean the interaction between people - why identify other recruitment/networking ways on such an operational segment? Why do employers' resort to such solutions? The central answers given by the questioned people are in order of the number of votes obtained: more than 160 people (81.2%) believe that employers are resorting to modern solutions because

"they can set up meetings immediately, even if the candidate is in another location/country" – this is the main reason and derives mainly from the concept known as "globalization". 67.8% see in this approach a decrease in costs with the displacement of the recruiters – both from the financial perspective and the time consumed. 112 persons, representing 55.4% see "speed" in the recruitment process and the speed with which one can identify an ideal candidate from the large "pool" of candidates and 37.8% believe that limiting the discussions/duration of interviews can make the company win – both from the financial perspective as well as the time earned in the HR department.

At the end of this questionnaire, we have prepared a question that tried to reverse the roles – for the candidate to put himself in the position of the recruiter and decide for his own company which method of interviewing is optimal. The dominant answer with 46% of the vote is given by the response involving "a mixt between all the methods – without eliminating the human touch". As can be seen in all the answers presented so far, candidates have different perceptions and expectations and therefore, an employer to identify the optimum employee will have to combine all recruitment methods. However, we have a percentage of 35.6% of the people surveyed who still prefer the face-to-face interview without manifesting openness to change. With a relatively small percentage, we identify the video interview (9.9%) – probably preferred by younger people who have adapted much faster to the digital era and with percentages below 5% we have the phone interview, online questionnaire, and an algorithmic selection.

Table. 1: Answers received for question – a synthetic presentation [9]

Question	**Answers (%)**				
Years of experience (professional field)	> 5 years	1-3 years	3-5 years	<1 year	The candidates are experienced employees
	74.30%	10.90%	7.40%	7.40%	
Age of respondents	18-30 years	31-40 years	41-50 years	>50 years	Well-balanced structure of respondents
	15.80%	32.70%	28.70%	22.80%	
Techniques that have been used for recruiting – interview face to face, or online (video/audio)	Any of them – I am kind of partial to this	Of course, face-to-face	Recruited directly from the social media channels	First focus question – asked in the introduction part of the questionnaire	
	55%	30%	15.30%		
Type of favorite interview	Video variant (Skype)	Face-to-face	By phone	Well balanced answers for the focus question asked in the introduction part of the questionnaire	
	37.60%	32.20%	30.20%		
Traditional interview - advantages	I can better understand the course of the discussion from the recruiter's gestures	Use non-verbal language-specific movements	Visiting the company's headquarters and effective visualization of the workspace brings added value in the meeting and will undoubtedly influence their decision to join a company	Feel more comfortable in the interview face to face	Concerned and consider advantage of the lack of need to know IT applications that allow the interaction of the employer-candidate
	66.30%	55.90%	53%	31.20%	13.90%
Traditional interview - disadvantages	Consider that the biggest drawback is the "emotion" when we face a recruiter	The time consumed and consider that at least the initial interviews "displacement" at the employer's premises is a time-consuming	The answers must be given immediately, and this becomes an anxiety	The investment in clothing as a disadvantage – mainly if employment is not materialized.	
	53.50%	41.30%	28.20%	22.30%	

Online video interview (personal) - advantages	Lack of need to travel to the employer's location	I can "earn additional thinking time to give the perfect answer".	Have no emotions regarding this method of employer-candidate interaction	Lack of need to purchase new clothes	Feel brave at a distance	Can also use some supporting elements during the discussion
	76.20%	29.70%	27.20%	25%	26%	16.80%
An online video interview (personal) - disadvantages	You need to pay more attention to the camera	Not benefit from the interpretation of non-verbal communication	Must always be technically prepared	Knowing how to use the Skype		
	36.60%	30.20%	30.20%	25%		
Telephonic interview (personal) - advantages	Lack of need to move to the employer's location	Dress casual and with comfortable clothes	A professional environment should not be created in the room where the call is answered	The time earned to think of a better response	Can use other "resource" to provide the best answer	Not seen by the employer
	71.30%	54%	41.10%	31%	20.80%	14.40%
Telephonic interview (personal) - disadvantages	They cannot figure out what the recruiter thinks of them	Such an interview is impersonal	The use of non-verbal language	It is difficult to relate to a person whom you do not see face to face	That they look quite well physically and unfortunately cannot benefit from this advantage	
	60%	50.50%	47.50%	23.80%	6.90%	
If tomorrow an employer contacts you and lets, you choose the preferred method to hold an interview – what will you choose?	Interview face to face	A video interview (Skype)	Phone interview	Traditional methodology is dominant, but the online segment is rising		
	58.90%	22.30%	18.80%			
Why do employers' resort to modern interview solutions?	They can set up meetings immediately, even if the candidate is in another location /country	A decrease in costs with the displacement of the recruiters	Speed - in the recruitment process	Limiting the discussions/ duration of interviews can make the company win – both from the financial perspective as well as the time earned in the HR department		
	81.20%	67.80%	55.40%	37.80%		
For the candidate to put himself in the position of the recruiter and decide for his own company which method of interviewing is optimal	A mixt between all the methods – without eliminating the human touch	Prefer the face-to-face interview	Video interview	Phone interview, online questionnaire, and an algorithmic selection.	The best answer is a mix between all the methodologies	
	46%	35.60%	9.90%	< 5%		

V. CONCLUSIONS

The conclusions following those presented in this paper reveal a candidate in continuous adaptation in the "digital era." The process of integration of the digital into the recruitment/interview area is nowhere near completed and it will undoubtedly take a long time until we can consider that recruitment in Romania is carried out online. However, we equally must know the "digital age" is here and everything that will follow, will be somehow linked to the digital – from the candidate position, we all need to adapt.

Now, we have a vast number of candidates (at least of those questioned) who prefer the traditional/classic way of interviewing. However, we also have a significant number of candidates who consider that the combination of online and traditional is the key to success at this time: the digital zone helps you reducing the time devoted to recruitment and eliminates the obstacles given by distance and geographic area, and through the face- to- face interview we identify the human side, the candidate's psychological and behavioral perspective.

Through this paper, we pursued several primary objectives; after the completion of the entire analysis, there are some representative elements:

- The surveyed candidates consider that the optimal interview is a mix between the online and the traditional one, face to face. They understand the need to use modern interviewing solutions, but the direct human relationship with the employer remains the dominant variant in terms of a job interview;
- The face-to-face interview is still preferred by most surveyed people, but the door for modern interviews is open – an approach that permanently gains ground and probably in the future will be the favorite variant of many;
- The surveyed candidates are prepared and understand very well what is happening now in HR and see the transformations of the HR area in recent years. There is a clear intention to be more flexible and to assimilate these transformations in HR more quickly and efficiently but in many cases lack some necessary skills to access online solutions – an aspect that intervenes and slows down the process of adaptation to modern interviewing solutions for some candidates.

Recommendations for companies/organizations:

- Sustain the formation/training of employees for online usage of resources;
- Communicate openly about online solutions and all the benefits that are generated in this process;
- Prepare and integrate online solutions – especially in the HR department – this will help the employee trust the online platforms for HR access;

Recommendations for companies/organizations:

- Start preparing for the future of HR – digitalization will be present in many processes, and every employee must be able to use the applications;
- Remain focus and open to new flows and online platforms.

Of course, we must also remember the limits of the research: the results obtained by this research are relevant because it presents a de facto situation on the perception of candidates in the financial-banking sector on the methods of interviewing used now in the recruitment process, to which we add that the answers to the questions may also have a certain degree of subjectivity from the respondents.

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A Study on Students' Social Competencies

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Abstract – The paper presents the effects and impact of different project in the field of entrepreneurship skills development and that include some training sessions for the social competencies' development in the case of students. The research has been focused on the social skills development in the case of students from the Engineering and Management specialization, but also, for the young researchers (PhD. students enrolled in different engineering specializations). In this context, there are debated: the social competencies development importance for the future engineers (parried with the technical abilities development), a research methodology for these competencies development (methods and tools that help a survey development based on structured questionnaires), the research results and some conclusions.

Keywords: Social competencies, training program, technical higher education

I. INTRODUCTION

In the context of this article, social skills are seen (needed and developed) to support the entrepreneurship behavior in the case of future engineers. The state of the problem was a quite difficult approach because of the technical competencies that must be strongly gained and that are dominant for every engineering curricula in Romanian higher education. However, the actual tendencies in establishing modern and attractive engineering programs curricula have started to join some important social competencies development that will better define the future engineers' personality at their workplace. The main problem consists of the scientific demonstration of the effective need for social competencies development!

Each student from the first year of study come and joins the academic community with his/her skills and abilities. Some are unique aptitudes and talents, which may include rare musical abilities (singing, playing an instrument, composing music), artistic skills (drawing, painting, sculpting), athletic skills (running, jumping, throwing), or any other ability that comes easily and naturally to them. Some skills and abilities are used in students' daily life: such as learning a new timetable or organizational procedure, repairing the writing tools, listening to other student problems, or deciding what cloths to buy. Other skills are more specific to a work/task, such as learning a new software program or interpreting financial statements (as the balance sheet) to manage a company budget.

In this context, Figure 1 represents an overview of the contingency theory of action and the job performance when three kind of interest must be satisfied simultaneously: the individual interests, the job demands and the organization interests. The contingency model of management effectiveness can postulate that the overlap degree or best fit between the individual, his/her job demands, and the organizational environment would predict effectiveness [2].

This model creates an intensive debate. This confusion between links searching at the competency or cluster level has often been the source of mistakes in linking competencies needed from individuals to be effective and the core competence of the organization. If engineering excellence is the core competence of a company, we should predict that the Goal and Action Management Cluster (or the Self-Management Cluster in the emotional intelligence model) would need to be the most frequently observed cluster to create and sustain this culture and strategy [3].

The components of the Self-Management Cluster in the emotional intelligence model are self-control, self-confidence, adaptability, change catalyst, achievement orientation and initiative [4]. They could be and they must be trained to young generation of engineers. The motivation for having specific academic subjects (or even students support activities) related to social competencies development is linked with the reality that many skills need of in the 21st century job market are more related to people interaction (also, connected with emotional intelligence development) [4].

The important idea behind this research is that skills and abilities can be added and/or improved upon through education, training, and experience. Professionals, and teaching staff, tutors and mentors, all professors must continue develop and enhance students' skills, and then career opportunities will come for them and can be choose more easily.

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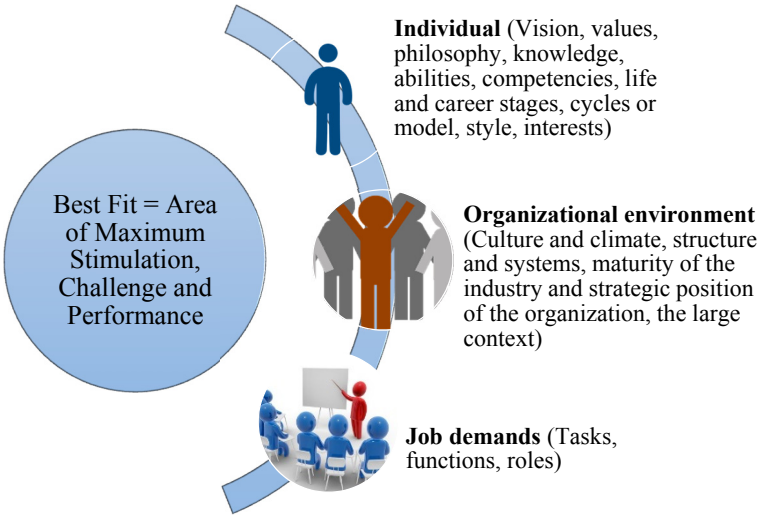


Fig. 1. The contingency theory of action and job performance [2]

Table 1 - SCAN model for social skills investigation (adapted from [5])

A. FOUNDATION SKILLS (transferable skills*)* are those skills that people bring to a job	
I. Basic Skills	**Reading** - Locates, understands, and interprets written information in documents including manuals, graphs, and schedules to perform tasks. Learn from text by determining the main idea or essential message.
	Writing - Communicates thoughts, ideas, information, and messages in writing. Composes and creates documents such as letters, directions, manuals, reports, proposals, graphs, and flow charts with language, style, organization, and format appropriate to the subject matter, purpose, and audience.
	Arithmetic - Performs basic computations using basic numerical concepts, such as whole numbers and percentages, in practical situations. Uses tables, graphs, diagrams, and charts to obtain or convey quantitative information.
	Speaking - Organizes ideas and communicates oral messages appropriate to listeners and situations. Participate in conversations, discussions, and group presentations. Speak clearly.
	Listening - Listen carefully, understand, and responds to listener feedback. Receive, interpret, and respond to verbal messages and other cues such as body language.
II. Thinking Skills	**Creative thinking** - Uses imagination freely. Combine ideas or information in new ways. Make connections between seemingly unrelated ideas and reshape goals in ways that reveal new possibilities.
	Decision-making - Specifies goals and constraints. Generate alternatives, considers risks, and evaluates and chooses best alternative.
	Problem solving - Recognize that a problem exists. Identifies possible reasons for the differences, creates and implements a plan of action to resolve them. Evaluate and monitor progress and revise plan as indicated by findings.
	Knowing how to learn - can adapt and apply new knowledge and skills to both familiar and changing situations. She/he can use ways of learning, such as note taking and organizing information. Become aware of false assumptions that may lead to wrong conclusions.
III. Personal Qualities	**Responsibility** - Exert effort and perseverance toward attaining goals. Work to become excellent at doing tasks by setting high standards, paying attention to details, working well even when assigned an unpleasant task, and displaying a high level of concentration.
	Social skills - Demonstrate understanding, friendliness, adaptability, empathy, and politeness in new and ongoing group settings. Assert self in familiar and unfamiliar social situations. Relate well to others. Respond appropriately. Take an interest in what others say and do.
	Self-management - Assess own knowledge, skills, and abilities accurately; set well-defined and realistic personal goals. Monitor progress toward goal attainment

	and motivate self through goal achievement. Exhibit self-control and respond to feedback unemotionally and non-defensively (self-starter).
	Integrity/honesty - Can be trusted. Recognize when faced with deciding or acting in ways that may break with commonly held personal or societal values. Understand the impact of violating these beliefs and codes in respect to an organization, self, or others. Choose an ethical course of action.
B. FUNCTIONAL SKILLS are specific to the functions workers perform doing their job	
IV. Resources	**Manage time** - Select important, goal-related activities and rank them in order of importance. Allocate time to activities and understand, prepare, and follow schedules.
	Manage money - Use or prepare budgets, including making cost and revenue forecasts. Keep detailed records to track budget performance and make appropriate adjustments.
	Manage material and facility resources - Acquire, store, and distribute materials, supplies, parts, equipment, space, or final products in order to make the best use of them.
	Manage human resources - Assess people's knowledge, skills, abilities, and potential. Identify present and future workload. Make effective matches between individual talents and workload. Monitor performance and provide feedback.
V. Systems & Technology	**Understand systems** - Knows how social, organizational, and technological systems work and operates effectively within them. Makes suggestions to modify systems to improve products or services and develops new or alternative systems maintenance and quality control.
	Uses technology - Judge that set of procedures, tools, or machines will produce the desired results. Understand the overall intent and the proper procedures for setting up and operating machines, including computers and their programming systems. Prevent, identify, or solve problems in machines, computers, and other technology.
VI. Informa-tional Skills	**Acquire and evaluate information** - Identify need for data. Obtain it from existing sources or create it and evaluate its relevance and accuracy.
	Organize and maintain information – Organize processes and maintains written or computerized records and other forms of information in a systematic fashion.
	Interpret and communicate information - Select and analyse information and communicates the results to others using oral, written, graphic, pictorial, or multimedia methods.
VII. Interperso-nal Skills	**Participate as a member of a team** - Work cooperatively with others and contribute to group effort with ideas, suggestions, and effort. Resolve differences for the benefit of the team and take personal responsibility for accomplishing goals.
	Teach others - Help others obtain necessary information and skills. Identify training needs and supply job information to help others see its use and relevance to tasks.
	Serve clients, customers - Work and communicate with clients and customers to satisfy their expectations. Actively listen to clients and customer to avoid misunderstandings and identify needs. Communicate in a positive manner, especially when handling complaints or conflict.
	Exercise leadership - Communicate thoughts, feelings, and ideas to justify a position; encourages, persuades, convinces, or otherwise motivates an individual or groups; responsibly challenges existing procedures and policies
	Work with cultural diversity - Work well with men, women, and those with a variety of ethnic, social, or educational backgrounds. Base impression on individual performance, not on stereotypes.

Source: adapted from http://www.soicc.state.nc.us/soicc/planning/skillsjob.htm

In addition, there have been important research developed that have debate the role of entrepreneurs' social competence linked with their financial success. The social skills described by them are linked with entrepreneur ability to interact effectively with other people as based on discrete social skills [1]. The research has underlined once again the importance of the social skills for the successful entrepreneurial behavior development.

The main problem that arise from the previous examples is to find a better tool (together with a creative method) for the social skills present status

identification and characterization and then to design an efficient training program for their development in accordance with some organization needs or generally for the success of an individual on the labor market.

SCANS could be a good example for this practical purpose. The Secretary's Commission on Achieving Necessary Skills (SCANS) that was created by the United States Department of Labor to study the skills needed in the American workplace gives a possible inventory of the social skills [5]. The SCANS competencies span the chasm between the worlds of school and the workplace. The 27 SCANS skills are divided into two categories: foundation and functional skills (Table 1) [5]. Based on the SCANS suggested social skills structure there have been build a questionnaire for the purpose of the social skills investigation in the case of the future engineers enrolled in master programs of the Faculty of Management in Production and Transportation from Politehnica University of Timisoara, Romania (UPT).

II. RESEARCH METHODOLOGY

A research survey based on a questionnaire have been adopted and implemented. The study surveyed master students of the second year of study, enrolled in master programs of the Faculty of Management in Production and Transportation from Politehnica University of Timisoara, Romania (UPT). 14 students were unemployed and 73 were employed in companies from the West Region of Romania. A total number of 87 students were part of the research sample that represents a good percent (the total number of master students is 124). the most important research variable that was consider was if the students are employed in some company. Students were selected randomly as they expressed their wish to be involved in the research. The e-mail and face-to-face structured interview method were adopted to obtain responses to the study's survey instrument. Although it was a resource intensive option, it was chosen over the standard methods of administrating paper or online surveys for various reasons: (1) to be able to clarify respondents' queries; (2) to avoid the situation whereby a busy student (as an executive or manager) delegated the task of fill-up the survey to a secretary or a co-worker; and (3) to ensure that most of the responses collected were complete and usable for data analysis. The research was developed from September 2019 till March 2020 and it will be repeat in April – June 2011 to collect much pertinent opinion from the master graduate students.

For the structured interview method approach a questionnaire has been developed using the social skills structure and description as presented in SCANS tool (Table 1). The questionnaire structure consists of 21 characteristics that define social skills. They have been described carefully to facilitate the master students understating and perception that will conduct to a very precisely answer. In the beginning of the questionnaire, the research aims, and a brief description of the answering procedure has been explained. Then a general single question was written: In the case of your profession, job or/and position work specificity, please indicate the level of social skills own by you to be efficient? All questions on social skills importance for a specific workplace or job description (in the respondent opinion) were measured on a six-point Likert scale (1 = "fully disagree" – 6 = "fully agree"). In the final part of the questionnaire, there were collected data for the respondent characterization (the background or bachelor studies that were graduated, the master program where she/he is involved, company where she/he is employed, position, age, sex, and contact data) for better described the research sample.

III. RESEARCH RESULTS

The figures show the preliminary research results in graphical presentation (responds obtained through questionnaires, absolute values). The SPSS software was used for the results visualization.

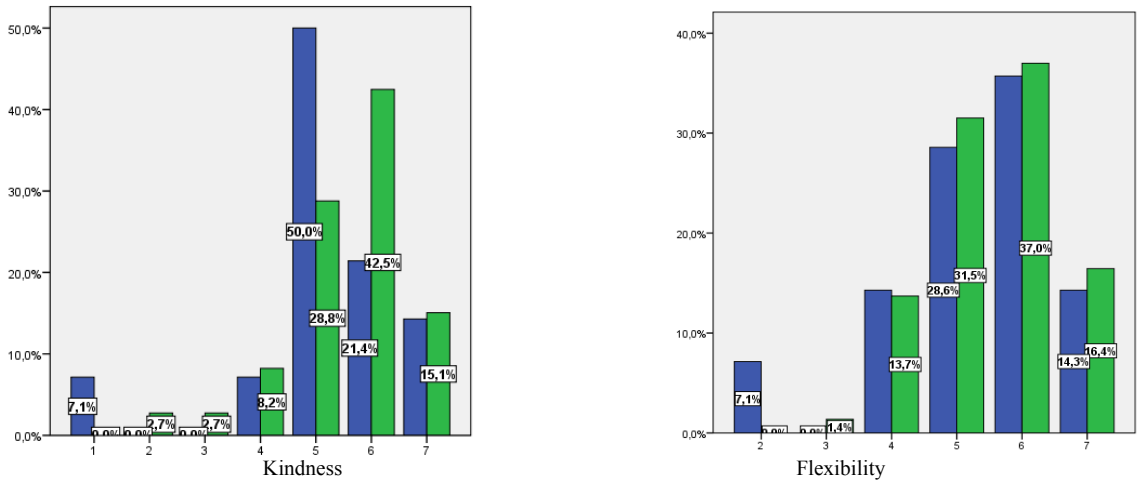
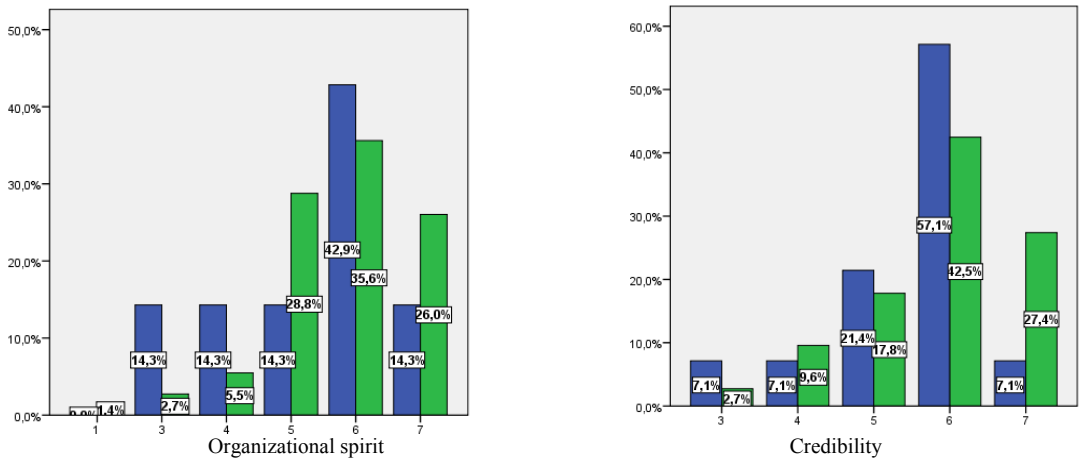
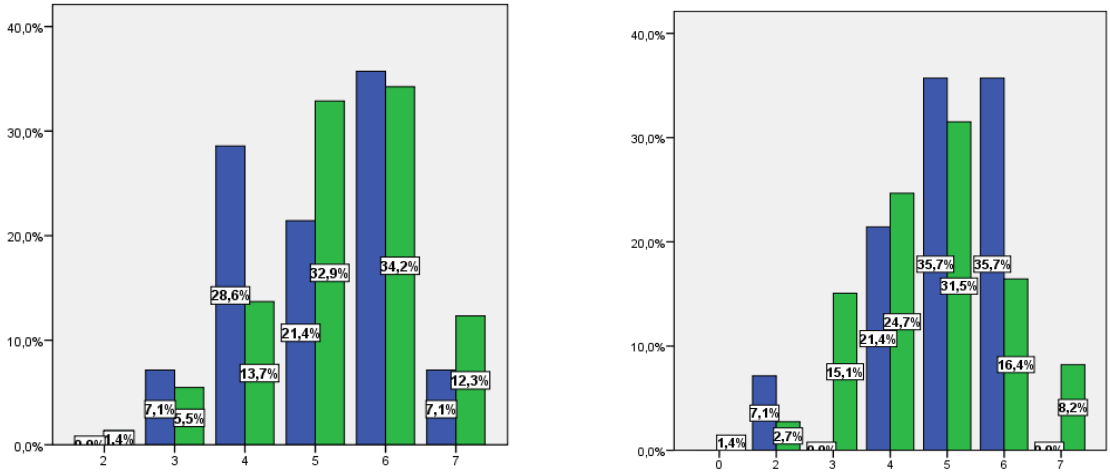


Fig. 2. The distributions of the responds for kindness and flexibility in behaviour (blue – unemployed students, green – employed students)



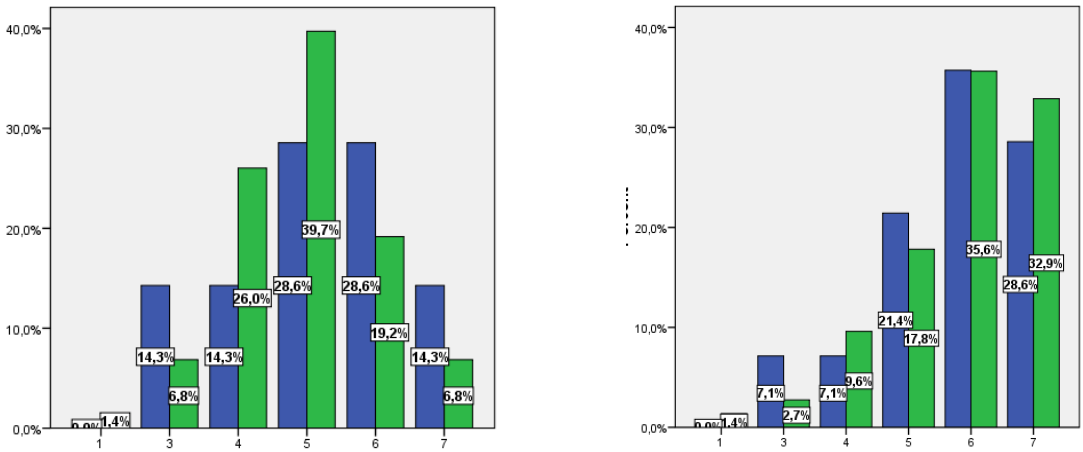
Organizational spirit Credibility

Fig. 3. The distributions of the responds for organizational spirit and credibility
(blue – unemployed students, green – employed students)



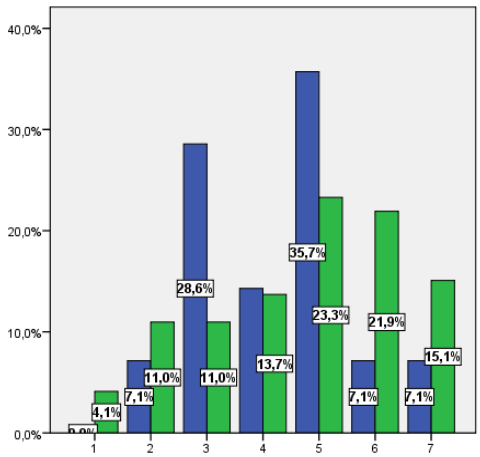
Self-development Negotiation

Fig. 4. The distributions of the responds for self-development and negotiation spirit
(blue – unemployed students, green – employed students)

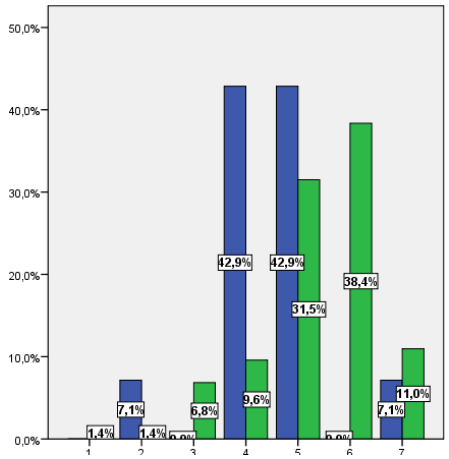


Persuasion characteristics Sociability

Fig. 5. The distributions of the responds for persuasion characteristics and sociability
(blue – unemployed students, green – employed students)

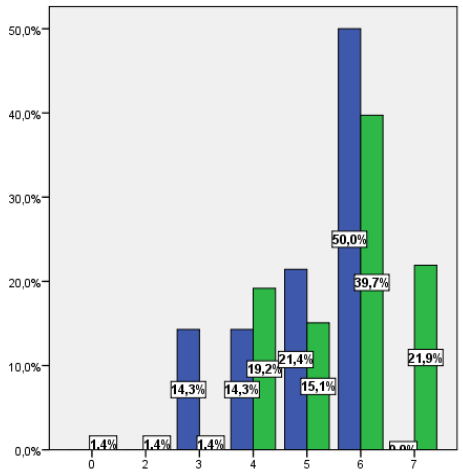


Social conformity

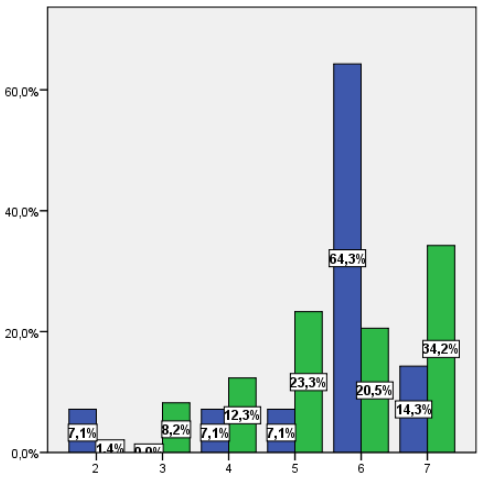


Situational intelligence

Fig. 6. The distributions of the responds for social conformity and situational intelligence (blue – unemployed students, green – employed students)

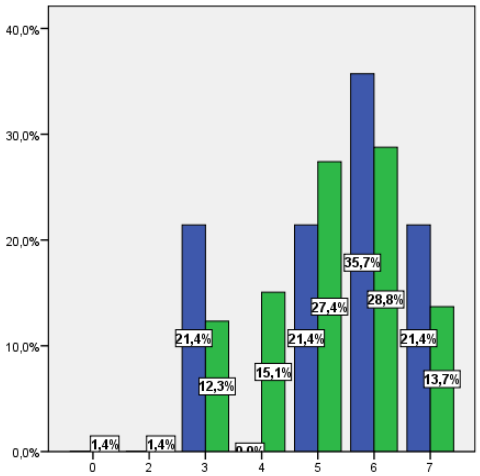


Self-control

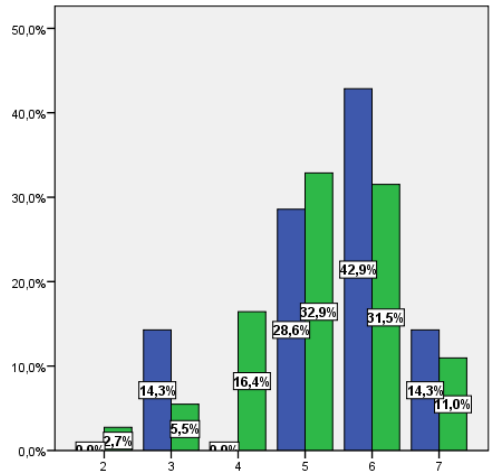


Self-confidence

Fig. 7. The distributions of the responds for self-control and self-confidence (blue – unemployed students, green – employed students)

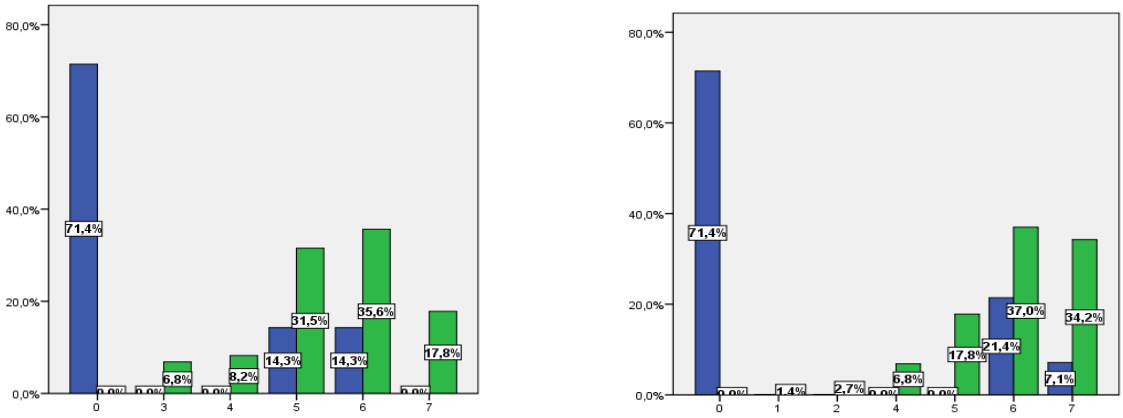


Pedagogical tact



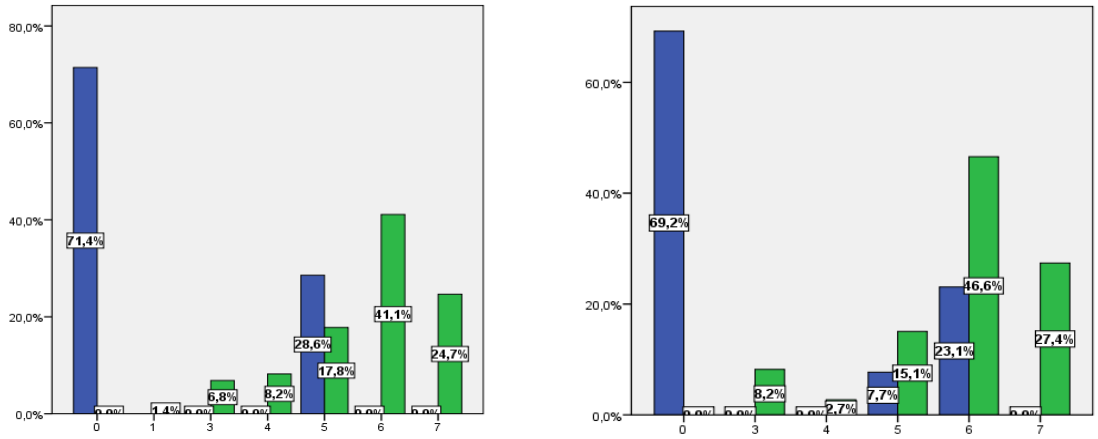
Verbal investigation skills

Fig. 8. The distributions of the responds for pedagogical tact and verbal investigation skills (blue – unemployed students, green – employed students)



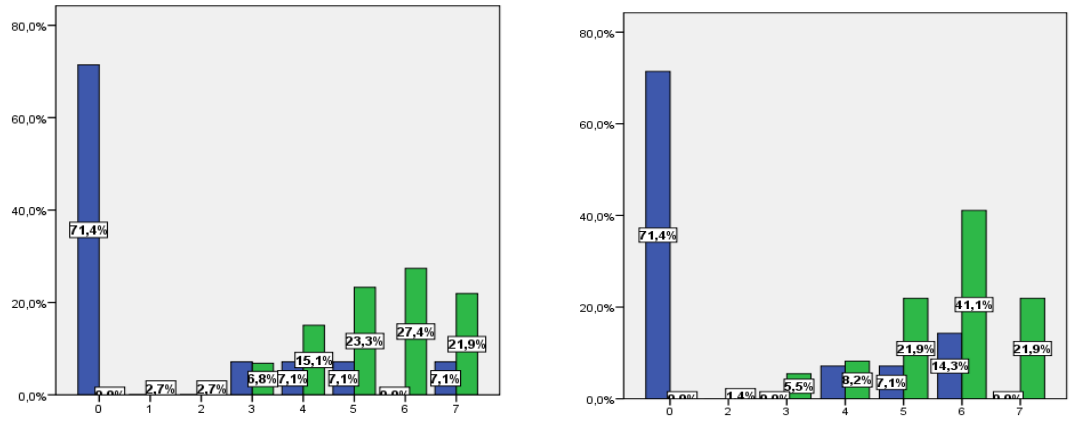
Self-development/satisfaction Openness to new challenges

Fig. 9. The distributions of the responds for self-development/satisfaction and openness to new challenges (blue – unemployed students, green – employed students)



Autonomy Ambition

Fig. 10. The distributions of the responds for autonomy and ambition (blue – unemployed students, green – employed students)



Prejudice resistance Verbal argumentation

Fig. 11. The distributions of the responds for prejudice resistance and verbal argumentation (blue – unemployed students, green – employed students)

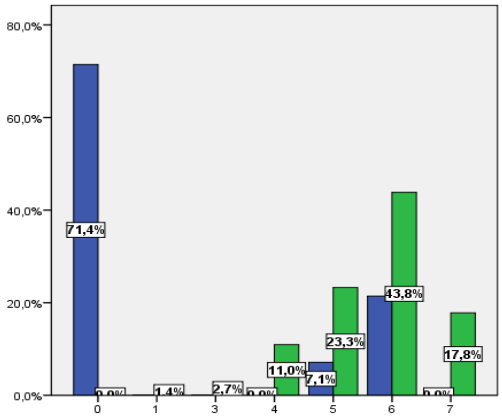


Fig. 12. The distributions of the responds for personal action and initiative (blue – unemployed students, green – employed sudents)

In figures with the graphical results of the research there have been represented in blue the results of the unemployed students and in green the responds of the employed students.

The responds were syntheses in Table 2 under the form of the social skills matrix. For each characteristic suggested by a specific question there have record the dominant answer for the two samples (one of the unemployed NE and the other of the employees E). Correlated with the Likert scale used for the answers level of perception, there were made the following

- Disagree / not needed correspond to the score obtained for the level 1 and 2 (arithmetic average);
- Neither agree nor disagree correspond to the score obtained for the level 3, 4 and 5 (arithmetic average);
- Agree / needed correspond to the score obtained for the level 6 and 7 (arithmetic average).

The total score shows the most needed social skills that are required for the job or the workplace. In addition, the social skills matrix is useful for the training program design in this field of soft skills development for students from engineering specialization. Table 2 shows that employed students are more interest in having and develop their social skills. Most of them agree in having 18 different social skills development and only three characteristics (self-development, negotiation spirit and persuasion characteristics) are neither agree nor disagree (they do not feel yet that these social skills are needed for their professional career development).

Table 2. The social skills matrix (research results)

Characteristics / Question	Disagree / not needed		Neither agree nor disagree		Agree / needed	
	NE	E	NE	E	NE	E
1. Kindness			X			X
2. Flexibility in behaviour					X	X
3. Organizational spirit					X	X
4. Credibility					X	X
5. Self-development				X	X	
6. Negotiation spirit			X	X		
7. Persuasion characteristics			X	X		
8. Sociability					X	X
9. Social conformity			X			X
10. Situational intelligence			X			X
11. Self-control					X	X
12. Self-confidence					X	X
13. Pedagogical tact					X	X
14. Verbal investigation skills					X	X
15. Self-development	X					X
16. Openness to new challenges	X					X
17. Autonomy	X					X
18. Ambition	X					X
19. Prejudice resistance	X					X
20. Verbal argumentation	X					X
21. Personal action and initiative	X					X
Total score	7	-	5	3	9	18

The unemployed students most agree of the importance of the flexibility behavior, organizational spirit, credibility, sociability self-control, self-confidence, pedagogical tact, and verbal investigation. They neither agree nor disagree on the importance of kindness, negotiation spirit, persuasion, social conformity, and situational intelligence. The unemployed students disagree on many social skills (answers to questions 15 to 21) because they are not used to think of their social need when considering working group inter-relationships.

IV. CONCLUSIONS

The paper have presented a study on characterizing the effects of different project in the field of entrepreneurship skills development and that include some training sessions for the social competencies' development in the case of students from technical sciences (engineering studies pf tertiary level). The research has been focused on the social skills development in the case of students from the Engineering and Management specialization, but also, for the young researchers (PhD. students enrolled in different engineering specializations). Thus, a comparative study has been developed by underling the two group of students' characteristics, one of students that were employees and another one consists of students that were unemployed (NE).

The method used for the investigation was the survey based on the SCAN questionnaire. It has been developed by the Secretary's Commission on Achieving Necessary Skills (SCANS) that was created by the United States Department of Labor to study the skills needed in the American workplace gives a possible inventory of the social skills. SCANS competencies span the chasm between the worlds of school and the workplace. The 27 SCANS skills are divided into two categories: foundation and functional skills (as shown in Table 1).

In addition, in the context of the paper there have been debated the social competencies development importance for the future engineers (parried with the technical abilities development).

As a supplementary result, the study shows that PhD. Students were more interested and motivate by the social skills development most because their major interest of a successful career development. Master students are most of them employee in the beginning of their professional life and thus, they do not understand the importance of the investigated skills.

The research for the social skills competencies' perception is considered mature to be extended to other group of students to improve their curricula with subjects or activities that promote the social skills development. The limits of the research results (graphical presentation and social skills matrix) are related to the investigated group of students.

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