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How effective are the lockdown and quarantine of the general population during the COVID-19 pandemic?

Abstract:
Previous studies have established a strong relationship between COVID-19-related deaths and a particular group of chromosomes (a Y-DNA haplogroup). By using data on the number of deaths from all causes, this paper correlates excess mortality with lockdown measures (as those measures are quantified by a containment and health index) and with this particular Y-DNA haplogroup in the European populations. A strong correlation between excess mortality during the pandemic and the genetic background of the population is reconfirmed. Yet, no meaningful correlation between excess mortality and lockdown policies is detected. In fact, the strictest containment measures in European countries are associated with higher excess mortality. A further comparison is made between three pair of countries, which are considered comparable population-wise and geographically-wise, but within each pair (Sweden-Belgium, Germany-France, Bulgaria-Greece) one country took stricter lockdown measures than the other. In all three pairs higher excess mortality was found in the country with the strictest containment measures.

Key-Words: Covid-10, pandemic, lockdown, quatantine

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1. Introduction

Almost a year after the outbreak of a new coronavirus disease (January 2020-December 2020) most governments are still struggling to contain a virus that has taken aback the most developed countries of the world, which were unaccustomed to pandemics of infectious and contagious diseases. In the lack of any effective medicine or vaccination, the governments have focused on Non-Pharmaceutical Interventions (NPIs) to alleviate the advent of COVID-19. These NPIs vary greatly as far as their severity and their duration are concerned. They can start from mild and self-evident measures like banning big athletic, cultural or national events where masses of people are crowded and they can escalate to closure of businesses and retail shops (partial lockdown), closure of schools and educational institutes of all grades, restriction of international movements and flights and even, in extreme cases, a quarantine of the general population, in which the population is forbidden to leave their household except for emergencies (absolute lockdown).

In this brief analysis we focus on European countries and try to assess how effective the NPIs or the so-called lockdowns were, during the first wave of the pandemic, that is in the spring of 2020 and to a lesser extent, during the second wave (October-December 2020). A first observation from the first wave is that there is a clear distinction in COVID-19 related mortality rates between Western and Eastern Europe. Western Europe experienced far greater Covid-19 related mortality than Eastern Europe (80 deaths per 100,000 population in the worst stricken Western European countries versus 1 to 3 deaths per 100,000 in the Balkan countries) (Anagnostou, 2020). In fact, the so-called first wave of the pandemic was barely noticeable (if not absent at all) in several Eastern European countries (table 1). The reasons for this epidemiological dichotomy between East and West Europe have been sought in a variety of factors, such as urban population density, total population density, mean household size and even the vaccination policy against tuberculosis (ibid: 41).

However, the most significant determinant of this dichotomy between East and West seems to be a genetic difference of the population of the two parts of Europe. More specifically, a group of chromosomes, called R1b haplogroup, also known as Hg1, (a human Y-DNA haplogroup) is the most frequently occurring paternal lineage in Western Europe, while its presence in Eastern Europe is much less frequent (Eupedia, 2020). From the start of the COVID-19 pandemic scientists tried to find underlying genetic factors to explain the different advances of the pandemic in different countries, or in different geographic areas into the same country. Therefore, as early as April 2020, population genetics offered a rationale as to why, for example, Northern Italy was severely affected by the pandemic while Southern Italy was not (Schillaci, 2020a; Scillaci, 2020b; Bentrem, 2020; Moreno, 2020). Other papers, alongside with the aforementioned ones, focused on the varying COVID-19 related death rates between Eastern and Western Europe (Anagnostou, 2020). All these studies have found a strong positive and statistically significant correlation between the prevalence of R1b haplogroup in the general population and the SARS-Cov-2 transmission and mortality. These studies suggest that there are certain genes that render some populations more susceptible to the COVID-19 pandemic.

Having established that the differential vulnerability of the populations to SARS-Cov-2 has a genetic background, one might wonder whether NPIs have any effectiveness at all.

2. Methodology and research questions

The first part of the analysis refers to the first wave of the pandemic, which was lighter for East-European countries, but inflicted heavy losses in human lives in several West European ones. The first wave was more intense from March to May 2020 in the European region (WHO, 2020). The paper investigates the relationship between 1) the «excess mortality» from

all causes in the first 8 months of 2020 and 2) the lockdown policies and the genetic background of the population of all European countries. The reason that we chose to use all deaths instead of coronavirus-related deaths are two:

- In the published data most countries do not separate deaths from COVID-19 and deaths with COVID-19.
- Excess mortality, that is the difference between the observed number of deaths from all causes, and the expected number of deaths for the same place and time of year, gives a clearer picture of the pandemic's impact.

In technical level the number of deaths (either weekly in the figures 1 to 4 or in an 8-month period in table 1) is standardized to reflect the relative surplus or deficit of deaths in 2020 compared to the average deaths of the previous three years (2017-19). Therefore, the baseline is 100 and any figure above 100 implies more deaths than the average in the previous three years, while any figure below 100 implies fewer deaths than the average. In many points of this text, the term "excess mortality" is used. Strictly speaking this term would be correct only if the population of the studied countries had not changed substantially between the average population in 2017-19 and that of 2020. This is an assumption necessary to substantiate that any deaths above the baseline of 100 constitute excess mortality. In any case, this assumption holds true at least for the six countries examined more thoroughly in this paper, because it is known that the population size of these countries did not change by more than ±2% from 2017 to 2020 (Eurostat, 2020a).

For assessing the effectiveness of lockdown policies in the first wave of the pandemic, European countries are classified in three categories according to the NPIs they took in spring 2020 (map 1). Six of these countries (2 North-western, 2 western and 2 eastern European ones) are taken as case studies. The comparison is performed in pairs. Each pair of countries has geographical proximity and similar size of population. Yet, within each pair, one country took strict measures during the first wave of the pandemic (March to May 2020) while the other one applied looser measures. The number of deaths from all causes in the general population is monitored in each week from January to the end of August 2020 and these weekly series of deaths are compared with the average number of weekly deaths in the previous three years (2017-2019). This comparison will give us any excess mortality in 2020 compared with the previous three years. Weekly and age specific excess mortality will allow us:

1) to assess the impact of COVID-19 in the mortality of the general population and in the mortality of broad age groups.
2) to make an informed judgment about the effectiveness of the lockdown policy.

The three pair of countries that were chosen as case studies are: 1) France and Germany, 2) Sweden and Belgium and 3) Bulgaria and Greece. As mentioned above, the pairs of countries were chosen because they had different lockdown policy during the spring wave of the pandemic. This is shown in map 1 of the paper.

Map 1 is intended to show how strict were the lockdown policies in each country and it takes into account both the intensiveness and the duration of the measures. It is based on the "Containment and health index", which has been fabricated by "The Oxford Covid-19 Government Response Tracker" (OxCGRT, 2020). The **Containment and health index**, in its turn, is based on 8 indicators:

1) School closing. Range: 0=no measures - 3=require closing all levels
2) Workplace closing. Range: 0=no measures - 3=require closing (or work from home) for all-but-essential workplaces
3) Cancel public events. Range: 0=no measures, - 2= require cancelling
4) Restrictions on gatherings. Range: 0=no restrictions, - 4= restrictions on gatherings of 10 people or less
5) Close public transport. Range: 0=no measures, 2= require closing

6) Stay at home requirements. Range: 0= no measures 3 = require not leaving house with minimal exceptions (eg. allowed to leave once a week, or only one person can leave at a time)
7) Restrictions on internal movement. Range: 0=no restrictions - 2= internal movement restrictions in place
8) International travel controls 0=no restrictions – 4= ban on all regions or total border closure

When this paper finished (beginning of December 2020) the timeseries of the weekly number of deaths from all causes for Greece (one the case studies) stopped in week 35, that is in the end of August 2020. Therefore, an analysis for the second wave of the COVID-19 pandemic (which took place in the fall of 2020 and was still ongoing in Greece in December of that year) was not feasible based on excess mortality. However, a brief analysis for the second wave is made by correlating the number of COVID-19 related mortality of the population with the containment and health index for all European countries, including Greece (second part of the analysis).

3. Analysis

3.1 First wave of the pandemic

Table 1: Relationship between «excess mortality», lockdown policies, and the genetic background of the population of all European countries.

Country	Standardized number of deaths from January to August 2020 (2017-19=100)	% R1b haplogourp	Containment Index from January to August 2020
Hungary	95.4	18.5	44.8
Latvia	95.6	12.0	40.5
Croatia	95.8	8.5	47.9
Bulgaria	97.2	11.0	37.3
Slovakia	97.6	14.5	45.1
Norway	98.2	32.0	36.1
Denmark	98.4	33.0	43.9
Lithuania	99.0	5.0	39.9
Estonia	99.3	8.0	29.2
Germany	99.4	44.5	49.4
Iceland	99.5	42.0	39.1
Slovenia	99.5	18.0	42.6
Czechia	99.5	28.0	42.5
Romania	100.0	15.5	40.0
Luxembourg	100.3	46.0	40.3
Serbia	100.3	6.0	44.7
Poland	100.4	12.5	41.6
Finland	100.9	3.5	33.2
Malta	101.0	32.5	-
Switzerland	101.0	50.0	42.0
Austria	101.2	32.0	43.5
Greece	101.8	15.5	43.8
Cyprus	102.2	9.5	48.3
France	105.2	58.5	49.9

Portugal	105.6	56.0	52.7
Albania	105.8	18.0	49.0
Sweden	107.0	21.5	39.6
Netherlands	107.6	49.0	42.1
Italy	107.8	39.0	57.4
Belgium	109.7	61.0	47.6
United Kingdom	114.4	67.0	47.8
Spain	116.5	69.0	48.6

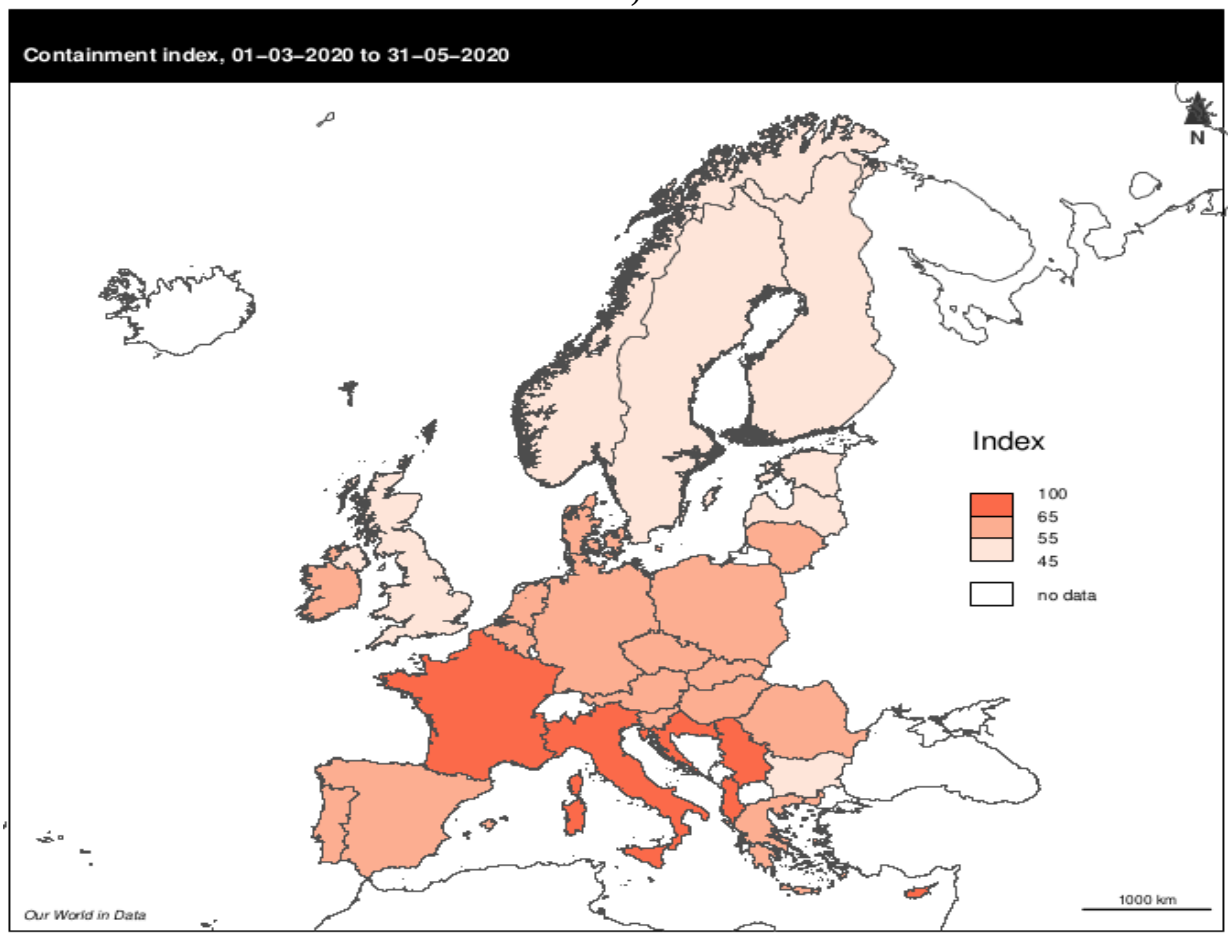
Source: For *Standardized number of deaths*: elaboration of data taken from Eurostat, 2020a. For *%R1b*: Eupedia, 2020. For the containment index: OxCGRT, 2020.

Table 2: Correlation between variables in table 1

Excess mortality	% R1b	Containment Index
Pearson's r:	0.69	0.45
p-value:	0.000	0.012

Source: table 1

Map 1: Containment and health index during the first wave of the pandemic (March to May 2020).



Source: data taken from Oxford COVID-19 Government Response Tracker https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker (accessed, November 27, 2020)

By and large tables 1 and 2 imply that the relationship between lockdown policies and the lethality of the pandemic is in the opposite direction of what one would expect. The correlation coefficient (pearson's r=0.45) suggests that the strictest containment measures, are associated with higher excess mortality. The coefficient is week but, nevertheless is statistically significant (p-value<0.05).

Map 1 and table 3 establish the different lockdown policy in spring 2020 within each pair of the examined countries. France implemented severe restrictions in the everyday movement of people nation-wide, closure of all essential shops and of all educational facilities and banning of mass gatherings and national events. It also restricted international movements (with the exception of some international flights). Germany, on the other hand, implemented only partial and regional restriction measures, while nationwide it closed schools and educational facilities for a shorter period than France did. Belgium with an average containment index of 62 during spring 2020, applied quite severe restrictions although internal movement restrictions were not applied nationwide. Sweden, the country with the lower containment and health index (47 during the examined period), implemented no closure of retail shops and businesses and only partial closure to some educational facilities (Universities). As far as the eastern European countries are concern, Greece implemented a prolonged quarantine and lockdown policy nation-wide, while Bulgaria did not impose a quarantine to the general population (Eurostat, 2020b).

However, both Balkan countries (Greece and Bulgaria) have low prevalence of R1b haplogroup in the DNA of their populations (10%-15%), while Belgium and France have a genetic background that makes them more susceptible to the SAR-cov-2 virus (percent of R1b haplogroup 61% in Belgium and 58,5% in France according to table 3). German and Sweden are intermediate cases as far as the prevalence of R1b haplogroup is concerned (44.5% and 21.5% respectively). As it is shown in tables 3 and 4 the "excess mortality" of these countries during the first wave of the pandemic was associated mostly with the prevalence of urbanization and the dominance of R1b haplogroup in their populations rather than with their lockdown policies. The Pearson's correlation coefficient is high and statistically significant at the 0.1 level of significance when we correlate excess mortality with urbanization and excess mortality with the percent of the population with R1b haplogroup. It is not statistically significant when we correlate excess mortality with the measures taken during the spring wave of the pandemic (table 4).

Table 3: Six European countries and selected indices that could be associated with the COVID-19 pandemic.

Country	**Population 2019 in millions**	**Population per km^2**	**% Urban population**	**Containment index (daily average March-May)**	**Highest weekly excess mortality from March to May 2020**	**% R1b haplogourp**
Sweden	10.23	23	87	47	51%	21.5
Belgium	11.46	376	98	62	111%	61.0
Germany	83.02	232	77	59	14%	44.5
France	67.01	118	80	68	64%	58.5
Greece	10.72	82	79	57	16%	15.5
Bulgaria	7.00	64	75	53	6%	11.0

Source: Population on 1st January: Eurostat, 2020c. Containment index: data from OxCGRT, 2020, own elaboration. Highest weekly excess mortality: Eurostat, 2020a, own elaboration. % R1b haplogourp: Eupedia, 2020

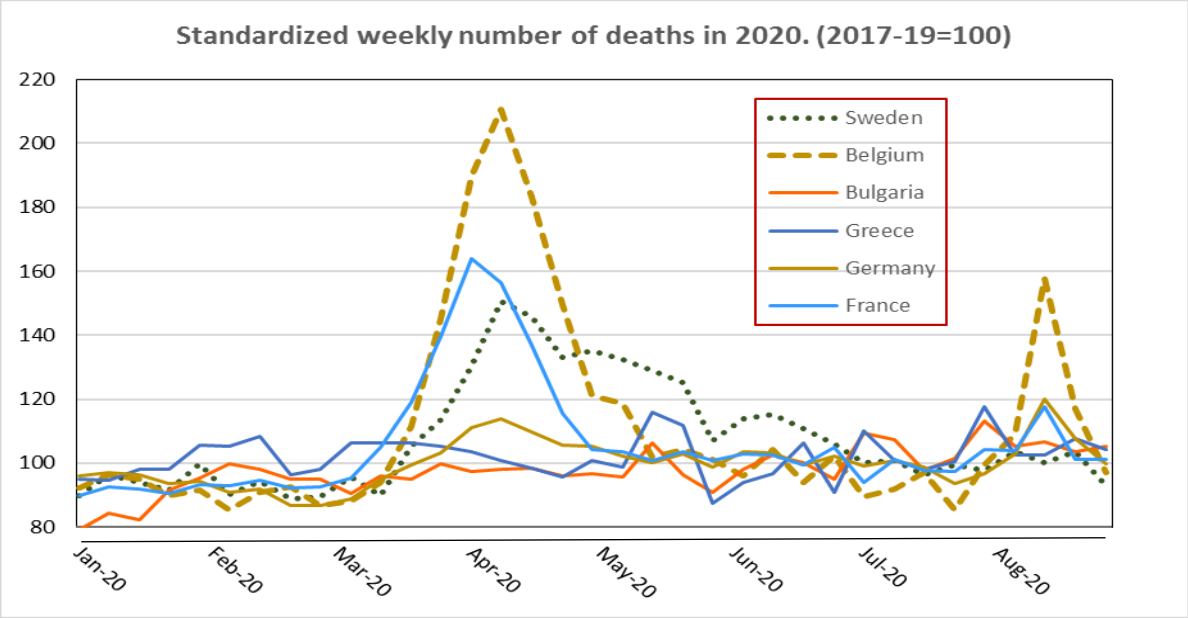
Table 4: Correlation between variables in table 3

Highest weekly excess mortality	Population per km^2	% urban	% R1b	Containment Index
Pearson's r:	0.616	0.914	0.739	0.397
p-value:	0.19	0.01	0.09	0.44

Source: table 1

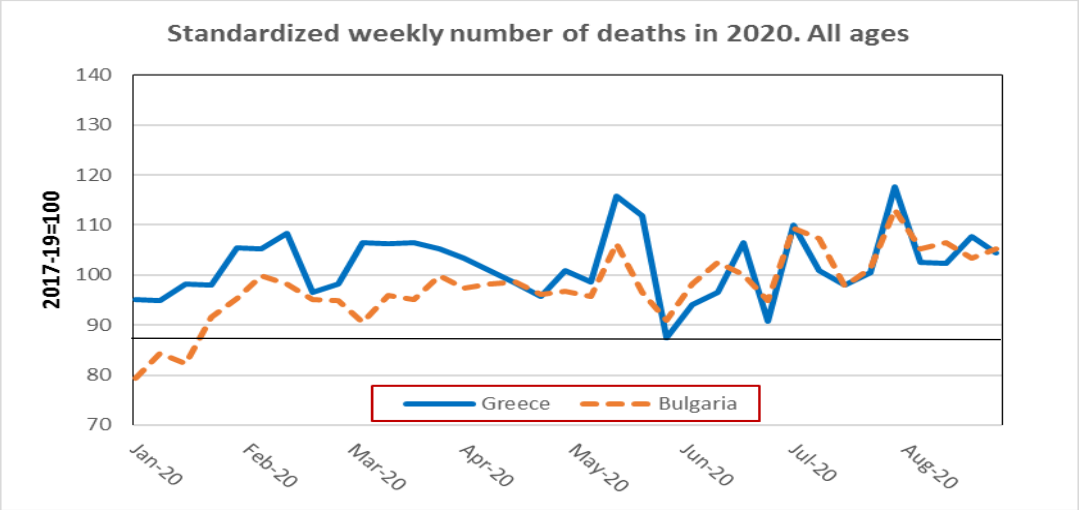
The following graphs inspect the weekly excess mortality in the first 8 months of 2020 (January to August). Figure 1 comprises all six countries and deaths of all ages. Figures 2, 3 and 4 focus on the two Balkan countries and on two broad age-groups (40-64 and 65+) as well.

Figure 1: Weekly deviation of the number of deaths from the baseline. All ages, 6 countries, January to August 2020.



Source: elaboration of data taken from Eurostat, 2020a.

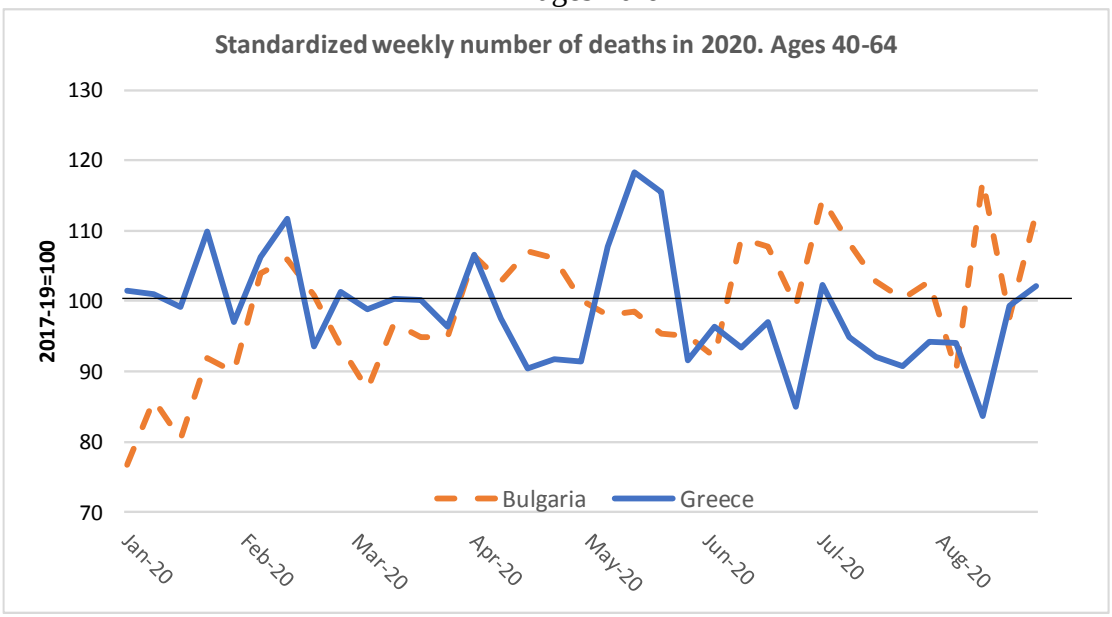
Figure 2: Weekly deviation of the number of deaths from the baseline. Greece and Bulgaria, all ages, January to August 2020.



Source: elaboration of data taken from Eurostat, 2020a.

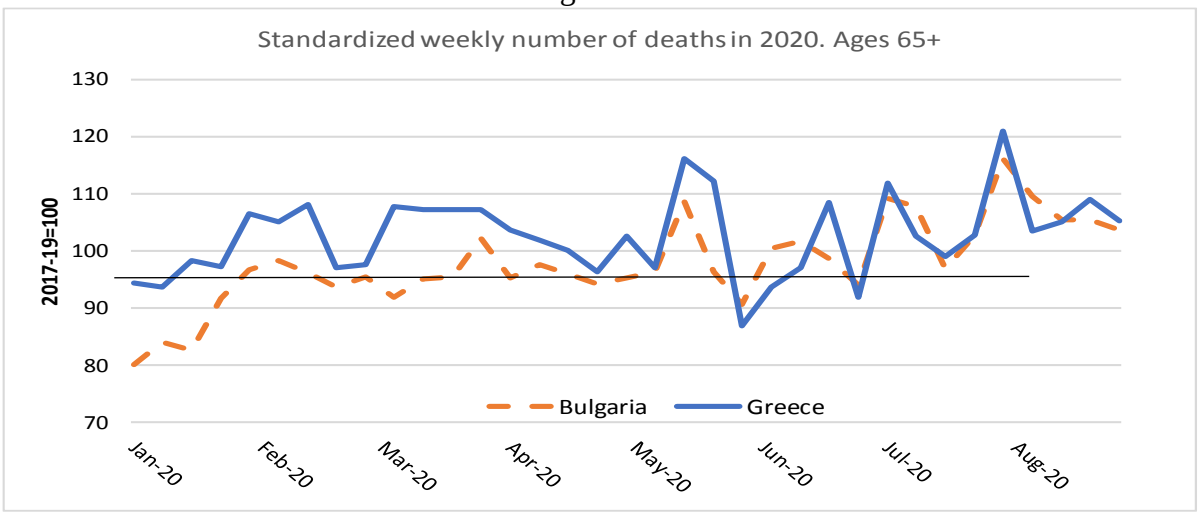
During the first wave of the pandemic, West European countries exhibited a remarkable high number of excess deaths (Figure 1). Belgium had 111% excess mortality in the second week of April while France had 64% excess mortality in the first week of April 2020 relative to the average number of deaths in the same week in the previous three years (2017-19). Sweden, on the other hand, despite not taking lockdown measures, never reached the excess standardized death rate of Belgium. In fact, data analysis of the weekly deaths shown that Sweden had fewer excess deaths than several West European countries. Italy, the Netherlands, Belgium, UK and Spain are countries that showed greater excess mortality than Sweden, despite the fact that they took stringent restrictive measures. Among the West European countries that exhibited fewer excess deaths than Sweden, were Finland and Denmark, countries that did not impose strict lockdown measures as well (Table 1).

Figure 3: Weekly deviation of the number of deaths from the baseline. Greece and Bulgaria, ages 40-64



Source: elaboration of data taken from Eurostat, 2020a.

Figure 4: Weekly deviation of the number of deaths from the baseline. Greece and Bulgaria, ages 65+.



Source: elaboration of data taken from Eurostat, 2020a.

What is peculiar with Greece is that the peak of excess deaths is recorded in the third week of May (Standardized Death Index=116), after 1,5 months of quarantine of the general population and more than two months since the first lockdown (which started on 11/3/2020 with the closure of educational institutes). After the 18th of May, the date that the general quarantine was removed and the population could circulate freely out of their homes and everywhere in Greece, excess deaths decreased and did not appear again (in a statistically significant number) until the first week of August. The above hypothesis is corroborated by figures 3 and 4, which show that excess deaths in May in Greece came mainly from people aged 40-64, that is people that are more likely to die of an unattended hearth attack or stroke rather than from an infection of the respiratory system.

As to what has caused excess mortality to the Greek population towards the end of the quarantine, only speculations can be made. It was not COVID-19 related deaths, since the daily number of these deaths decreased in May (from 3.4 average daily deaths in April to 1.3 in May; source: elaboration of EODY daily bulletins, 2020). However, there are evidence from the Greek hospitals, which combined with similar data from other countries, allow us to stipulate the hypothesis that the excess mortality was one of the side-effects of the general quarantine. In Greece only 10% of all strokes and heart attacks went to the hospitals during the spring quarantine, and, therefore deaths from cardiovascular diseases could not be avoided (Professor Spyros Zakynthinos on Eidiseis.gr 7/11/2020). In the UK, USA and Italy there was a sharp rise in the number of seriously ill people dying at home of a cardiac arrest and of strokes because they were reluctant to call for an ambulance (Spinney, 2020).

However, this excess mortality is not present in Bulgaria, which did not take the strict quarantine measures of Greece.

3.2 Second wave of the pandemic

As mentioned in the methodology section, due to lack of data, the assessment of the effectiveness of the lockdown policies in the second wave of the pandemic will be based on the relative number of deaths attributed to the new coronavirus (deaths from COVID-19 per 1,000,000 population) and not on the excess mortality of the general population.

Table 5: Relationship between COVID-19-related deaths and lockdown policies amidst the second wave (November 1-December 5, 2020)

Country	Deaths attributed to COVID-19 per million population (1/11/2020 - 5/12/2020) **(1)**	Containment Index from 1/11/2020 to 5/12/2020 **(2)**
Albania	132	67
Austria	294	81
Belgium	486	68
Bulgaria	497	53
Croatia	379	49
Cyprus	31	74
Czechia	520	75
Denmark	27	56
Estonia	40	35
Finland	10	42
France	280	83
Germany	100	65
Greece	218	80
Hungary	410	66
Italy	346	75

Latvia	96	56
Lithuania	164	67
Luxembourg	308	61
Malta	197	-
Netherlands	133	67
Norway	13	53
Poland	376	74
Portugal	294	72
Romania	271	69
Serbia	157	59
Slovakia	271	69
Slovenia	655	74
Spain	222	76
Sweden	108	51
UK	213	66

Source: For the COVID-19 deaths: Our World in Data, 2020. For the Containment index: OxCGRT, 2020

Pearson's r (1)*(2)=0.409. p-value=0.026

Table 5 re-confirms the conclusion drawn for the first epidemic wave: the relationship between lockdown policies and the lethality of the pandemic is in the opposite direction of what one would expect. The correlation coefficient (Pearson's r=0.45) suggests that the strictest containment measures, are associated with higher mortality from COVID-19. The coefficient is week but, nevertheless is statistically significant (p-value<0.05. It seems that lockdown policies may aggravate the impact of the pandemic. An explanation of this adverse effect of lockdown could be that when the population is obliged to stay home for the greatest part of the day, conditions behind the closed doors are more favorable for the spread of the coronavirus, due to the long hours that members of the same family stay together.

4. Discussion

In this paper a comparison was made between neighboring countries with the same, more or less, population size (or in the same magnitude) like Germany-France, and Bulgaria-Greece. The pair of Sweden-Belgium was also included in the analysis because they both have similar population size and are both north-west European countries, despite the fact that they are geographically quite apart from one another. The comparison refers to the excess mortality during the first wave of the new coronavirus pandemic.

Within each pair, one country took stricter containment measures during the first wave of the pandemic (France, Greece and Belgium) and the other one looser measures (Germany, Bulgaria and Sweden). Paradoxically, within each pair, greater excess mortality was recorded in the country that took the stricter measures: Belgium recorded a spectacularly high excess mortality compared to Sweden, France recorded much higher excess mortality than Germany, and Greece recorded 10% higher excess mortality than Bulgaria did during the spring of 2020.

For the second wave of the pandemic, which started in October of 2020 in Europe, the assessment of the effectiveness of the lockdown policies was based on the relative number of deaths attributed to COVID-19 (deaths per 1,000,000 population) and not on the excess mortality of the general population. The results of the analysis were the same as for the first wave: The correlation between COVID-19-related mortality and containment index in 30

European countries indicates that the strictest containment measures are associated with higher mortality from COVID-19.

Could someone conclude that prolonged lockdowns and the quarantine of the general population have a detrimental effect to the health of the population? It may be the case, as professor J. Ioannidis claims in an article published by the leading medical journal BMJ (BMJ 2020;369:m1924). Especially in countries like Greece, where two and three-generation-families live in the same household, conditions behind the closed doors might be more favorable for the spread of the coronavirus, due to the long hours that members of the same family stay together. The above statement is an educated guess resulting from the results of our analysis. What is indisputable is that a great part of the mortality due to COVID-19 depends on the genetic background of the population. In any case, even well-designed lockdowns that do not increase deaths by keeping different generations locked in the same household, all they do is to postpone cases and deaths that will happen eventually anyway (Gavi, The vaccine alliance, 2020; BMJ 2020,369:m1924; Rossi et al., 2020).

Overall, the side effects of a general quarantine are sometimes more detrimental to the public health than beneficial, even if one does not take into account the economic devastation as a side-effect of the lockdown. In the case of Greece, for example, the prolonged containment measures imposed in spring 2020, seemed to have postponed temporarily cases and deaths from COVID-19, but evidence suggests that they have caused more deaths from unattended strokes and heart attacks, which under normal conditions would have been avoided. The ubiquitous media exposure and the "Stay Home" campaign can lead people to perceive coronavirus threat as higher in risk compared to conditions such as cardiovascular diseases and malignant neoplasms, and thus not going to hospital except when is too late for their condition to be treated.

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5. Bibliography

Anagnostou S. (2020) 'The unexplained East-West Dichotomy in COVID-19 incidence in Europe: Exploring the R1b Y-DNA haplogroup hypothesis'. *Journal of Regional and Socio-economic Issues*, 10 (4), 40-47.

Bentrem F. (2020) 'COVID-19 Death Rate: Is it in our DNA?' DOI: 10.13140/RG.2.2.29960.65289/1 https://www.researchgate.net/publication/341829481_COVID-19_Death_Rate_Is_it_in_our_DNA Retrieved November 10, 2020

BMJ (2020) 'Should governments continue lockdown to slow the spread of covid-19?' *British Medical Journal*, 369:m1924 https://www.bmj.com/content/369/bmj.m1924 Retrieved December 4, 2020.

EODY (2020) *Daily Reports on COVID-19* [in Greek] https://eody.gov.gr/epidimiologika-statistika-dedomena/ektheseis-covid-19/ Retrieved December 9, 2020

Eupedia (2020), Haplogroup R1b (Y-DNA) https://www.eupedia.com/europe/Haplogroup_R1b_Y-DNA.shtml (Retrieved November 27, 2020)

Eurostat (2020a) *Deaths by week, sex and 5-year age group* https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_r_mwk_05&lang=en

Eurostat (2020b) Covid maps https://covid-statistics.jrc.ec.europa.eu/Map Retrieved November 27, 2020.

Eurostat (2020c) *Population on 1st January by age, sex and type of projection* *https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_19np&lang=en* Retrieved November 27, 2020

Gavi, the vaccine alliance (2020) 'Do lockdowns actually work?' https://www.gavi.org/vaccineswork/do-lockdowns-actually-work Retrieved, November 27, 2020

Moreno G. (2020) 'Coronavirus, Population Genetics, and Humanities' *Mirabilia Journal*, 30 (1), 1-15.

Our World in Data (2020) Coronavirus (COVID-19) Deaths https://ourworldindata.org/covid-deaths Retrieved, December 7, 2020.

OxCGRT (2020) Oxford Covid-19 Government Response Tracker https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker Retrieved November 27, 2020.

Rossi R., Socci V., Talevi D., Mensi S., Niolu C., Pacitti F., Di Marco A., Rossi A., Siracusano A., Di Lorenzo G. (2020) 'COVID-19 Pandemic and Lockdown Measures Impact on Mental Health Among the General Population in Italy' *Frontiers in Psychiatry.* https://doi.org/10.3389/fpsyt.2020.00790 Retrieved November 20, 2020

Schillaci, S. (2020a) Possible link between COVID-19 susceptibility and genetic factors. http://sxs.altervista.org/coronavirus/ Retrieved, November 27, 2020

Schillaci, S. (2020b, May 26). 'Possible Correlation between COVID-19 Contagion and Y-DNA Haplogroup R1b'. https://doi.org/10.31219/osf.io/yv8kc Retrieved, November 27, 2020

Spinney L. (2020, April 16) 'Concern as heart attack and stroke patients delay seeking help' *The Guardian.* https://www.theguardian.com/world/2020/apr/16/coronavirus-concern-heart-attack-stroke-patients-delay-seeking-help Retrieved December 6, 2020.

WHO (2020) COVID-19 Explorer: New confirmed deaths in European Region by date of report https://worldhealthorg.shinyapps.io/covid/ Retrieved December 9, 2020.

Zakynthinos S. (2020) interview on Eidiseis.gr 7/11/2020 https://www.ieidiseis.gr/ellada/item/66971-spyros-zakynthinos-to-lockdown-itan-proimo-kleinei-i-koinonia-gia-na-apofefxthei-i-dysfimisi-tou-prothypourgoy, accessed 27/11/2020)

Female Leadership in Education: A Critical Overview

Abstract:
This article explores women's presence in and/or absence from leadership positions in education. Through a kaleidoscope of theories and models, it discusses the obstacles that prevent them from acquiring top leadership positions in the market in general and in education in particular. Then, through different leadership models, the article discusses the different leadership styles between men and women, and then shows how women's leadership style gains ground slowly both in the labor market and in education.

Key-Words: Education, Leadership, Female, Mentors, Higher Education.

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1. Introduction

Women's participation in the educational process, both as students and professionals, has not always been recognized. During the 19th century, the situation started gradually being changed,and rates of primary education for girls began to increase, even though that was not applicable to secondary and higher education. Generally, in regard togirls' attendance of school in the mid- 20th century, the educational system was characterized as "inhospitable" for them (Mannan, Sharma, Hoque,&Veeriah, 2016).

Nevertheless, it appears that the education sector was one of the first to accept the role of women as professionals. As noted in studieson horizontal and vertical discrimination against teachers' profession, education was one of the first areas that accepted women for work. Women's social role, as defined in terms of family, wasextended mainly after women's suitability of the female gender for the profession of teacher (Eagly& Carli, 2007) had been introduced in compulsory education.

From the research that has been done, it is conspicuous that there are several motivating factors forwomen to choosethe teaching profession. On the one hand, there are personalmotivations, which are set by each individual's objectives with regard to teaching profession and the evolutionary course as a professional. On the other hand, at a social level, teaching profession is considered ideal for women. This is because teaching profession may help women to balance the demands of teachingand beinga mother. According to some researchers, a key factor is that teaching is identified with family life and care (Drudy, 2008;Fischman, 2000), thus making teaching more appropriate for women, whereas other researchershighlight key features of working in the educational field and the fact that women are more likely to accept the low prestige of teaching and low wages, because it is a form of work that is consistent with women's domestic responsibilities (Weiner, 2005). Thus, for women a profession in the field of education is considered highly preferable, since its working hours can allow women to have a family and take care of its members (Sanchez & Thornton, 2010).

What is to be noted is that from a historical point of view, as women have been occupyingmore and more educational positions, men have tried to occupy senior position, seeking to be accepted in and recognized by a profession that has been dominated primarily by women.

2. Women's presence in educational leadership

Gradually, the status of women as headteachers (or principals), their presence in the field of education, the possible differences between men and women inadministration and, more particularly, in school managementstarted to go under examination. More specifically, many feminist research studies that were conducted in the 1980saimed to show the female presence in the area of administration and, in particular, ineducational administration, since, from a historical point of view,it has been shown that up to that time education was male dominated and thus only or mostly male opinions were expressed in studies (Dodds, 2016).

There have been several researcherswho have highlighted that because there ishigh representation of women in teaching, teaching as such is considered a female occupation. More particularly, relevant research investigates whether the teacher's profession is related to social stereotypes aboutwomen's role in society and the family (Davis, Major, Cook,& Bell, 2015).Nevertheless, at the same time there are studies that have shownthata low presence of women in higher posts of school

administrationillustrates that basically women are excluded from the upper hierarchyin education.

There are other researcherswho have conducted empirical investigationsatschoolsand whohave reached certain conclusions on women's leadership style. More specifically, women headteachersare characterized by more democratic, participatory, cooperative and effective styles during the decision-making process. In addition, they strive to maintain a good and friendly school climate as well as effective communication between teachers, students and parents (Smit, 2013). All these attitudes and behaviors fall into one of the main objectives of an effective head teacher; that is, the creation and maintenance of a good school climate. These findings emerged after views of a large sample of participantshad been assessed. It should be noted, however, that these data relate to managers and head teachersin Secondary Education. Another recent research inthe identity of headteachers inGreek Primary Education, which was conducted nationwide during the 2002-2003 school year and involved totally 566male and female headteachers, attempted to develop a profile of the Greek headteacher inPrimary Education. The researchers recorded the attitudes, opinions and perceptions of male and female headteachersas to the motives that led themtopursue a management position, the qualifications which they consider necessary for achieving a managerial position and the evaluation criteria and selection procedure of male and female headteachers. With regard to gender representation in managerial positions, the analysis demonstratedmen's numerical superiority to women (Shalfi, Virk,& Hussain, 2014).

An interesting survey studied the terms of education concerning the participation of men and women in educational administration. The survey included 8 women and 22 men. One of the main objectives of the investigation was to determine whether the proportion of women in senior management positions in the field of education is satisfactory. Based on the participants' responses, a lot of participants were not satisfied with the women's participation ratein senior management positions, despite the fact thatmost primary school teachers are women (Fennel, 2005).

3. The causes of women's poor representation in education al leadership

The phenomenon of women'spoor representationin leadership positions in the education community is not a recent phenomenon and exists in most countries in the developed world. This may not apply to all levels of education though, as some evidence suggests an increase of women principals in elementary education. Consequently, there have been many efforts to investigate the causes and the obstacles that women encounter when entering into managerial positions.

More specifically, the investigation of the factors that contribute to women's exclusion fromeducational administrative development has led to many interpretative approaches and theoretical models. There are two dominant patterns / models: attribution of responsibilities on women teachers themselves, which stresses individual responsibility, and the attribution of responsibilities on social interactions and social structures.

A recent review that applied the diachronic approach, incorporated four levels of analysis: the level of social systems, the organizational level, the interpersonal level and the individual level. The researchers noted that, based on their research, there was a consistent difference in favor of men in terms of access and resource usage for power. They also report that the road of women to leadership resembles a path full of obstacles. More specifically, there are three broad categories of factors explaining conditions and practices that create barriers to women's career advancement in senior

administrative positions in education: (a) individual factors; (b) cultural factors; and (c) structural and organizational influences (Mannan, Sharma, Hoque, & Veeriah, 2016).

As far as individual factors are concerned, Timmers, WillemsenandTijdens (2009) indicate that women fail to reach higher positions, due to the fact that men and women are different, in accordance to the individual approach; for example, it has been noted that men are more likely to take ethical decisions based on interpersonal rules as to what is fair, whereas women are more likely to decide on the basis of their interest for specific people, and,thus, placingmore value on interpersonal relationships (Parylo, Zepeda & Bengtson, 2013).

Stereotypes associated with these reflected individual differences between sexes may constitute an invisible ceiling for women's advancement in senior management positions in the field of education. As discussed earlier, women's rolehas been traditionallyrelated to taking care of the household and children, while men's rolehas been more related to working environment. More value has been placed on men compared with women with the result that women areconsidered inferior to men at a professional level, and, eventually, have a lower position in the occupational hierarchy (Coleman, 2004; Olusola, 2016).

The approach to individual factors also includes the governing style that is associated with both sexes. A traditional style of leadership associated with men is based on the hierarchical structure of the organization, in which both guidelines and communication are done through official channels and decision-making process takes place at the top of the hierarchy; in other words, a top down decision-making process. However, as recently reported, a leadership style that is oriented towards human relations is possibly more favorable, brings better employee performance and innovation, highlights employees' abilities and results in theirgreater commitment and motivation (Fuller, 2017). Overall,women and men have various similarities and differences that do not just belongto a biologically or socially constructed group. People belong to different social classes, races and cultural communities, which identify them more specifically than their own gender (Arar&Shapira, 2012; Mollel & Tshabangu, 2014).

Now, according to the **cultural and organizational approach**, women's limited successintaking up senior management positions may be due to the organizational framework, in which cultural and ideological elements are underlain (Timmers et al., 2009). According to various researchers, although the administration of organizations is characterized as gender neutral, it often includes practices relating to men's traditional traits (Willemsen, 2002). Another cultural factor that may affect women's career advancement includes social aspects. The authoritarian nature of bureaucracy dispels any benefits for women, and this kind of exercising power and control limits women's access to decision-making processes. Respectively, it has been suggested that bureaucracy hides within it the need for masculine traits in order for one to succeed in organizations (Eagly & Carli, 2007).

In conclusion, on the one hand, the individual approach, the absence of women fromeducationaladministration has been attributed to lack of ambition, motivation, interest, self-confidence and administrative capacities. Nevertheless, this approach has received several critiques, such as that it has been highly simplified (Coleman, 2004). On the other hand, the cultural and organizational interpretive approach attempts to justify the exclusion of women from the administrative hierarchy of education in

accordance to their economic and social structures and relationships (Armandi, Khorshidi & Aram, 2014).

4. The obstacles women face in educational leadership

With regard to the obstacles that women face in terms of choice and their evolution in senior administrative positions, the barriers are classified as "inner" and "outer". On the one hand, internal barriers are those which in order to be overcome the person has to change his/her character, i.e. a reference to a lack of confidence, lack of competitiveness and low self-esteem (Coleman, 2001; Mannan, Sharma, Hoque & Veeriah, 2016). Other inner barriers could be described as family objections, increased family responsibilities (such as raising children), lack of standard respective roles, and the lack of support from colleagues (Mirderikvand & Dadfar, 2016).

On the other hand, external obstacles include discrimination against gender mainstreaming in practice and the attitudes that this discrimination generates.External barriers can be social and organizational structures, which, if one wants to overcome them, both social and institutional changes are needed. It is also worth mentioning that the biggest obstacle for women is amale-dominated culture, and this is the reason why all these specific obstacles can be located in a society that supports and enhances a male-dominated system, where there is a reproduction of patriarchyeven in different form and extent.

In this male-dominated society, women's work leads to a division between the private space (work at home) and the public space, which, eventually, leads to gender discrimination in administrationand can be reflectedon the following categories:

a) governing stereotype (leader = male);
b) functioning of networks-the role of mentor;
c) the dominant governing style;
d) bureaucratic structures-models; and
e) thechoice of headteachers(Davis, Major, Cook,& Bell, 2015).

Bascia and Young (2001) discuss about another categorization of barriers that women face in their professional development, and proposethree types of obstacles: (a) personal-psychological; (b) socio-political and cultural; and (c) institutional-organizational-operating (Mirderikv and & Dadfar, 2016).

At the same time, there are three models for interpretation of barriers. **The first model** focuses on the woman as a person possessed by internal barriers. Such obstacles spring out of socialization and stereotypicalgender roles, and are those that guide the woman's behavior, preventing her from evolving professionally. According to this model, the responsibility for development or non-development in educational administrationlies with the person himself/herself. For a woman to overcome these obstacles, a woman should be integrated into men's world during her socialization. **The second model**refers to obstacles associated with the structure and function of the agency, including male hegemony and women's self-limitationin low-prestige jobs. **The third model** of interpretation refers to the existence of male dominance in all areas of social development. Male domination is an obstacle for women in terms of their progress to senior management positions in the field of education (Netshitangani & Msila, 2014).

From the aforementioned models and social practices, it is conspicuous that family obligations andmany years of male-dominatedstereotypes in education continue to affect the majority of female employees. The conflicts experienced by women between work-career and family represent a series of barriers not only to women's career advancement in administration but also in career planning.

5. Breaking Barriers to Gender Equity

5.1 Effective Practices

Women face many dynamic barriers in terms of developing from just teaching into leadership roles; however, these barriers can be broken. Fennell's study (2005) hasidentified common patterns in the life experiences of six women principals. Although the study has not investigated gender differences, it has highlighted the practices that women use to overcome barriers. Fennell has established that these female leadershave: (a) worked to develop a collaborative environment under a common vision; (b) valued people and their contributions; (c) used power and made it expandable to others; and (d) have resisted practices that interfered with the overall goals, thus confronting issues as needed in their positions as educational leaders. These leaders have employed the stereotypical female styles to proactively promote change. Although the characteristics may be considered stereotypical, they pertain to the feminine way of knowing, which is embedded in social relationships.

Moreover, with experience, peer mentors, and training, women have become more comfortable in leadership roles; as women persist in leadership roles they might "take on more risks, becoming more daring and less afraid of personal consequences" (Bloom &Erlandson, 2003). The willingness to take risks might also be related to power attainment and skill development. Following interviews with women in elite educational leadership positions, Shields (2005) have concluded that women who understand power, can effectively and wisely use it to overcome gender issues, and are able to promote positive changes in leadership. Furthermore, a common style for female leaders involves a focus on collaborative activities-instruction, skill development, and relationship building with their educational stakeholders (Grogan, 2005), which are consistent with the current paradigm of effective education leadership. With such paradigm shifts in process, and as they become more widely accepted, women relate better to educational positions.

5.2 Mentors

For educators who aspire to leadership positions or currently hold positions as educational leaders, mentors are critical for job effectiveness (Coleman, 2001; de Santa Ana, 2008; Grogan, 2005; Méndez-Morse, 2004; Sherman, 2005). For example, de Santa Ana (2008) has advised aspiring superintendents to stay focused, gain experience, take risks, develop networks, and enlist effective mentors. Sherman (2005) has affirmed that leadership development programs can help aspiring leaders identify potential mentors, coordinate mentorship, and promote mentoring opportunities. In addition, Méndez-Morse (2004) has observed that many mentor relationships do not have to match gender. However, effective mentor relationships that incorporate a gender match are functional and can provide support for personal experiences with gender barriers (Magdaleno, 2006).

However, Sherman (2005) has cautioned that mentorships or stand-alone leadership preparation programs cannot influence change -they must be an integral part of K-12 systems. According to the same scholar, such programs must implement strategies to recruit women, have formalized processes for recruitment, have an induction program for new administrators, and include training after placement. Thus, mentor relationships and other support structures can help women obtain, succeed, and retain educational leadership positions.

5.3 Balance of Work and Family

Although some women in positions of educational leadership may struggle with balancing work and family obligations, women have creatively balanced both responsibilities. However, the extent of this balance will clearly vary from person to person. A single approach is not appropriate or sufficient, because issues - such as marital status, the spouse's traits, and the family structure- get involved, or as Mahitivanichcha & Rorrer, (2008) put it that compressing time-juggling different thoughts, decisions, and tasks simultaneously, or multitasking-permits women to accomplish more than one task at a time, including balancing job and family responsibilities.

Grogan (2005) noted that the United States is founded on stories of white women and women of color whose work to manage a home and family affairs has never been described as leadership, though it was crucial to the survival and success of all. Women can contribute to effective leadership, and those who strive to become effective leaders canimplement various life course strategies to help balance work and family efforts. Loder (2005) illustrated that women often plan when to get married, when to have children, and how to carefully integrate life-changing events. Women must carefully consider such events to facilitate an appropriate balance between work forces and family obligations.

5.4 Higher Education

Advanced degrees are entry requirements for leadership positions. However, a decision to earn an advanced degree requires significant planning and related transitions. Such a decision requires require a balance parallel to those discussed above. Higher education has been experiencing a transition in the enrollment numbers within educational leadership programs. Shakeshaft, Brown, Irby, Grogan, and Ballenger (2007) noted that anecdotal information from preparation programs indicates that the majority of the students are women. Therefore, this could expand the number of qualified female candidates for positions of educational leadership. This, hopefully, will promote more female leaders in schools and lead to more gender equitable leadership.

5.5 The Synergistic Leadership Theory

The effective practices highlighted above further demonstrate that women should be themselves and should not feel the pressure to conform to patriarchal practices in order to move forward. Women's practices of inclusion, collaboration, valuing others and their contributions, and theirability to balance work and family are helpful in breaking barriers to gender equity in educational leadership. In any case, Irby, Brown, Duffy, and Tautman (2002) affirmed that, even though such practices are widely advocated, they are not incorporated in common leadership theories.

However, Synergistic Leadership Theory (SLT) that has been introduced by Irby et al. (2002) openly acknowledges the feminine organization as a major component, something that is lacking in other leadership theories.This leadership model includes the following four factors that serve as dynamic interactions: (a) attitudes, beliefs, and values; (b) leadership behavior; (c) external forces; and (d) organizational structure. These four factors have six interaction pairs, and there is no structural hierarchy or linear nuance (Irby et al., 2002; Leonard & Jones, 2009). Furthermore, the model contains "both male and female leadership behaviors, a range between closed and open organizational structures, and infinite possibilities of external forces and attitudes, beliefs, and values" (Irby et al., 2002). Leonard and

Jones (2009) noted that effective 21st century leadership can be fostered through the gender inclusive framework of SLT.

6. The effect of the Glass Ceiling

Social scientists use the term "glass ceiling" to describe the invisible barriers that block the hiring, promotion and vocational training of persons who have the necessary qualifications, but who are not promoted because of their gender, race or ethnic origin (Eyeh, 2011).In the mid1980s, the term "glass ceiling" was used to describe the invisible barriers that women face and preventthem from accessing higher levels of a company or a public service and, generally,the top of the hierarchy of their organization (Goetz, 2013).

The few women who consistently account for the levels of the hierarchymay suddenly reach an invisible barrier such as the "glass ceiling". This phenomenon describes all the frustrationthat women experienceat all levels of administration, including artificial or invisible barriers (based on opinions and prejudices) that slow or stop their career advancement to senior andhighest positions in the hierarchy of enterprises. There has also been a second term that has been used:"the floors that stick", denoting women's restraint in the same positions (Levy, 2010).

However, nowadays “the glass ceiling” seems to have been provenwrong. There are researchers, such as Blackmore (2013), claiming that women who have managed to obtain leadership roles in businesses, universities and elsewhere have equal access with men both to recruitment and to promotion in middle management positions. Still, the transparency that alludes to the "glass ceiling" is misleading, since the obstacles women faceare not only inconspicuous but also visible. In conclusion, researcherssuggest that women do not stop at the penultimate step before the top, but a large number of them enter at various levels of development to the top of the administrative hierarchy (Blackmore, 2013).

7. Balancing professional and family responsibilities

The reconciliation of work and family life is an issue that concerns both female and maleemployees. On the one hand, women who wish to have a career are invited to fight for equal opportunities in the workplace, which burden family/private life (Fuller, 2013). At the same time, women employees fightto retain the right to maternity and childcare, without solely experiencing the burden of unpaid domestic work (Bailyn, 2003; Lewis, 2003; Rapoport, 2002). As a result, women are pressured and find it difficult to adapt to the new reality without neglecting family and/or work. They may feel stressed out, with negative consequences on their physical and psychological health, their quality of life, their satisfaction with their family life, and their performance in work-social roles. This may lead to intense feelings of loneliness and isolation (Gamblesetal, 2006; Layard, 2003; Lewis, 2003).To enter into such positions, women must be able to combine work and family. As such, most women entering into senior positionshave usually overcome these kinds ofproblems (e.g.they have raised their children). In addition, one of the reasons why the teaching profession is chosen by women is because they can combine their professional role with their familyresponsibilities (Johnson & Campell-Stephens, 2010).

There are **three key factors** to achieve reconciliation between family and work. **First**, there are leave allowances (maternity, parental, etc.) and otherworking patterns/schedules (flexible, reduced, etc.) (Johnson &Cambell-Stephens, 2013). **Second**, men who have a career and a family try to get involved with their children

upbringing. The modern man's/father's relationship to his family and his presencein it is most evident, as he can now share economic and housing powersand can play an active role in his children's daily lives, co-operating with the woman/mother in decisions concerningthe children's upbringing. Surveys conducted in recent years have investigated specific activities including situations where fathers are taking care of the children (e.g. feeding, reading, cleaning, school visit, etc.) (Showunmi, Atewologun, &Bebbington, 2016). Yet, men have more leisure time than women, who have household duties and obligations entailed in the upbringing and care of children.

Third, it is the reference to childcare and services provided at home (such asthose for the elderly).Such services include public and private crèches and nurseries, public and private kindergartens (in recent yearskindergartens have progressed to all-day care in order to facilitate working parents), all-day public primary schools and children's camps (with high or low fees).Finally, home care programs, although these kinds of programs are more relevant to the elderly and the chronically ill (Dezso & Ross, 2012), represent an additional service that may assist women in balancing their family and professional obligations.What is discussed in the previous paragraphs can be described as the woman's "double role" model is is consolidated and expanded. The differences between men and women in assuming this double role confirm that even with new working conditions the two genders do not compete in equal terms in the labor market (Msila, 2013).

8. Concluding Remarks

8.1 Men's leadership style

As discussed in the international literature, the concept of leadership seems to have been identified primarily with the male gender, as historically men have dominated both in management and in the exercise of power. In many studies, in terms of leadership and management, gender is a non-obvious factor, and there is an implicit assumption that the male experience is the norm, an assumption that usually leads to the absence of women's voice in this area (Muzvidziwa, 2013).

In the field of administration and the exercise of power, the dominance of male stereotypes and values, such as competitiveness, ambition, repression of emotions and sensitivity, daring and risky behavior, and assertivenessprevents women from occupyingleadership positions or forces them to adopt the values and behaviors of the malestereotype. As such, "feminine values", such as affectivity, caring, intuitiveness, receptivity, the provision for the welfare of others, devotion, and sensitivity, may be rejected by those who are about to undertake power (Coleman, 2002).

Men's predominance is reflected on and included in education systems and is, therefore, seen as a particular value system. Factors associated with men (i.e. the male work, the experiences and the stereotyped masculine values and characteristics)are considered more important and universalthanthose of women, whereas women's perspective and experience come second (Eyeh, 2011).In a male-dominated society, where women may play a subordinate role, the female teacher has less chance to secure a managerial position in the hierarchy of education and faces more problems in the performance of her administrative tasks (Goetz, 2013).

8.2 Women's leadership style (Transformational leadership)

According to research, women define power differently from men. They are very cooperative and less authoritarian than men, as they exercise more democratic

administration. This seems to encourage wider participation in decision-making, focusing on the wellbeing and development of others and the allocation of power, while keeping the channels of communication open (Daily & Dalton, 2003; Van Knippenberg, 2004). Instead, men develop behaviors that focus on control, goals, and official "formal" power.

Transformational leadership emphasizes the empowerment of people and extends the need for organizations to become less hierarchical, more flexible, and oriented to the group rather than the individual, thus more participatory. This theory of leadership may be directly associated with women's stereotypes,according to which women are expected to behave like leaders.This is the reason that has sparked interest in the study of the interaction of transformational leadership and gender (Levy, 2010).

According to a study by Tharenou (2001), the management style that originally led women to a middle management level, prevents them from progressing to the upper echelons. Additionally, women's governing style has beenbased on two dimensions: the orientation towards the project and orientation towards people. From the results of research it has been found that, as women rise in the hierarchy, they tend to use governing style geared towards the project. This findingappears to be consistent with previous researches, which argue that women feel the need to alter their governing style in order to accept themselves as leaders. Thus, while women may be more open, collaborative and geared towards people and empowerment, they feel that they should adopt a more "masculine" administrative style (Blackmore, 2013).

Regardless of their position in the hierarchy, women appear to have orientation towards humans. This is consistent with the international literature whichviews women as cooperative, fair, and helpful, providing encouragement, interest, and understanding towards others. The existence of children has beenpositively associated with this leading dimension, as well as the multiple roles played by a woman, such as participation in voluntary organizations andthe close relations that develop both as a partner and as a friend (Fuller, 2013). In a comparative study of vocational development among 55 successful women managers, the adoption of a leadership style oriented both towards work and the creation of groups has beena decisive success factor for women. Indeed, many scholars/students stress that for a woman to advance as a leader she should combinehigh capacities and effective interpersonal relationships (Msila, 2013).

9. References

Arar, K., & Shapira, T. (2012). Leading a quiet revolution: Women high school principals in traditional Arab Society in Israel. *Journal of School Leadership, 22*, 853-874.

Armandi, M., Khorshidi, A., & Aram, F. B. (2014). The relationship between the needs of secondary schools principals and teachers. *Journal of Applied Environmental and Biological Sciences, 4*(3), 90-94.

Bailyn, L. (2003). Academic careers and gender equity: Lessons learned from MIT1. *Gender, Work and Organization, 10*(2), 137-53.

Bascia, N.,& Young, B. (2001). Women's careers beyond the classroom: Changing roles in a changing world. *Curriculum Inquiry, 31*(3), 271-302.

Berkovich, I., & Eyal, O. (2015). Educational leaders and emotions: An international review of empirical evidence 1992-2012. *Review of Educational Research, 85*(1), 129-167.

Blackmore, J. (2013). A feminist critical perspective on educational leadership. *International Journal of Leadership in Education: Theory and Practice, 16*(2), 139-154.

Bloom, C. M., & Erlandson, D. A. (2003). African American women principals in urban schools: Realities, (re)constructions, and resolutions. *Educational Administration Quarterly, 39*(3), 339-369.

Brunner, C. C., & Grogan, M. (2005). Women leading systems: Latest facts and figures on women and the super in tendency. *The School Administrator, 62*(2), 46-50.

Coleman, M. (2001). Achievement against the odds: The female secondary head teachers in England and Wales. *School Leadership & Management, 21*(1), 75-100.

Coleman, M. (2004). Gender and Secondary school leadership. *International Studies in Educational Administration, 33*(2), 3-20.

Daily, M. C., & Dalton, R. D. (2003). Women in the boardroom: a business imperative. *Journal of Business Strategy,24*(5).

Davis, J. D., Major, A., Cook, D., & Bell, J. (2015). Women educational leaders' narratives: The dynamics of service learning on training and transformation. *International Journal of Progressive Education, 11*(3), 64-76.

De Santa Ana, T. M. (2008). Opening up the super in tendency. *Leadership, 38*(1), 24-27

Dezso, C.L., & Ross, D.G. (2012). Does female representation in top management improve form performance? A panel data investigation. *Strategic Management Journal, 33*(9), 1072- 1089.

Dodds, T. (2016). *The experiences of first-generation women from south-central Appalachia who have obtained their Doctorate degree in educational leadership.*(Unpublished doctoral dissertation). Department of Educational Leadership and Policy Analysis, East Tennessee State University.

Drudy, S. (2008). Professionalism, performativity and care: Whither teacher education for a Gendered Profession in Europe. In B. Hudson & P. Zgaga, (Eds.). *Teacher education policy in Europe: A voice of higher education institutions (*pp. 43-62).Faculty of Teacher Education, University of Umeå.

Eagly, H. A., & Carli, L. L. (2007). Women and the labyrinth of leadership. *Harvard Business Review, 85*(9), 62-71.

Eyeh, S.O. (2011). From myth to consciousness: The novel as mimetic mode of women's sociocultural and political transformation in Nigeria. *Nigeria English Studies Association, 13*(2), 137-150.

Fennell, H. A. (2005). Living leadership in an era of change. *International Journal of Leadership in Education, 8*(2), 145-165.

Fishman, B. (2000). How activity fosters CMC tool use in classrooms: Re-inventing tools in local contexts. *Journal of Interactive Learning Research, 11*(1), 3-27.

Fuller, K. (2013).*Gender, Identity and Educational Leadership*. London: Bloomsbury.

Fuller, K. (2014). Gendered educational leadership: Beneath the monoglossic facade. *Gender and Education*, 26(4), 321-337.

Fuller, K. (2017). Women secondary head teachers in England: Where are they now?.*Management in Education, 31*(2), 54-68.

Gambles, R., Lewis, S., & Rapoport, R. (2006). *The myth of work-life balance: The challenge of our time for men, women and societies.* Chichester: John Wiley & Sons.

Goetz, A. M. (2013). *No shortcuts to power: African women in politics and policy making*. London: Zed Books.

Grogan, M. (2005). Echoing their ancestors, women lead school districts in the United States.*International Studies in Educational Administration, 33*(2), 21-30.

Irby, B. J., Brown, G., Duffy, J. A., & Tautman, D. (2002). *The synergistic leadership theory. Journal of Educational Administration, 40*(4), 304-322.

Johnson, L.,& Campbell-Stephens, R. (2010). Investing in diversity in London schools: Leadership preparation for black and global majority educators. *Urban Education, 45*(6), 840-870.

Johnson, L.,& Campbell-Stephens, R. (2013). Developing the next generation of black and global majority leaders for London schools. *Journal of Educational Administration, 51*(1), 24-39.

Layard, R. (2003). *Happiness: Has social science a clue?.* London School of Economics: Memorial Lectures.

Leonard, N., & Jones, A. (2009). Synergistic leadership theory. *International Journal of Educational Leadership Preparation,* 29- 35.

Levy, P. Y. (2010). *Industrial organizational psychology: Understanding the work place.* New York: NY Worth Publishers.

Lewis, S. (2003). *The integration of work and personal life. Is postindustrial work the new leisure?.Leisure Studies, 22*(4), 343-345.

Lewis, S., Rapoport, R., & Gambles, R. (2003). Reflections on the integration of work and personal life. *Journal of Managerial Psychology,18*(8), 824-841.

Loder, L., & Spillane, P. (2005). Is a principal still a teacher? US women administrators accounts of role conflict and role discontinuity. *School Leadership and Management, 25*(3), 263-279.

Magdaleno, K. R. (2006). Mentoring Latino school leaders. *Leadership, 36*(1), 12-14.

Mahitivanichcha, K., & Rorrer, A. K. (2008). Women's choices within market constraints: Revisioning access to and participation in the super in tendency. *Educational Administration Quarterly, 42*(4), 483-517.

Mannan, F., Sharma, S., Hoque, KE.,& Veeriah, J. (2016). Predictive validity of gender and experience of teachers in Malaysian women principal's instructional leadership practices. *Malaysian Online Journal of Educational Management, 4*(3), 52-67.

Mardirekvard, F., & Dadfar, M. (2016). Studying relationship between (outer-inner) control source and (role–personality) conflict by second level high school headmasters of township Khorramabad. *Journal of Global Pharma Technology, 3*(8), 56-66.

Méndez-Morse, S. (2004). Constructing mentors: Latina educational leaders' role models and mentors. *Educational Administration Quarterly, 40*(4), 561-590.

Mollel,N., & Tshabangu, I. (2014). Women in Educational Leadership: Conceptualizing Gendered Perceptions in Tanzanian Schools. *Educational Research International, 3*(4), 46-54.

Msila, V. (2013). Obstacles and opportunities in women school leadership: A literature study. *International Journal of Educational Studies, 5*(4), 463-470.

Muzvidziwa, V.N. (2013). Married women breadwinners: A myth or reality?.*Alternation, 20*(2), 317-335.

Netshitangani, T., & Msila, T. V. (2014). When Theheadmaster is female: Women's access to education management positions in a rural setting. *Pensee Journal,76*(10), 259-266.

Newton, R. S., Giese, J., Freeman, J., Bishop, H.,& Zeitoun, P. (2003). Assessing the reactions of males and females attributes of the principal ship. *Educational Administration Quarterly, 39*(4), 504–532.

Olusola, I. A. (2016). Esther: Biblical model for women leadership role in contemporary Nigeria. *Jurnal Indonesia untuk Kajian Pendidikan, 1*(1), 77-86.

Parylo, O., Zepeda, J. S., &Bengtson, E. (2013). Career paths in educational leadership: Examining principals' narratives. *Alberta Journal of Educational Research,58*(4), 565-599.

Rapoport, R., Bailyn, J.K., Fletcher, J.K., & Pruitt,B.H. (2002). *Beyondwork-family balance: Advancing gender equity and workplace performance.* San Francisco: Jossey-Bass.

Sanchez, E. J., & Thornton, B. (2010). Gender Issues in K-12 Educational Leadership. *Advancing Women in Leadership Journal, 30*(13), 2-15.

Shakeshaft, C., Brown, G., Irby, B. J., Grogan, M., & Ballenger, J. (2007). Increasing gender equity in educational leadership. In S. S. Klein (Ed.), *Handbook for achieving gender equity through education* (2nd ed.) (pp. 103-129). Mahwah, NJ: Lawrence Erlbaum Associates.

Shalfi, A. N., Virk, N. M., & Hussain, A. (2014). Leadership practices for school improvement: Gender Disparities.*International Journal of Current Research and Academic Review, 2*(9), 204-213.

Sherman, W. H. (2005). Preserving the status quo or renegotiating leadership: Women's experiences with a district-based aspiring leaders program. *Educational Administration Quarterly, 41*(5), 707-740.

Shields, C. M. (2005). Hopscotch, jump-rope, or boxing: Understanding power in educational leadership. *International Studies in Educational Administration, 33*(2), 76-85.

Showunmi, V., Atewologun, D. & Bebbington, D. (2016). Ethnic, gender and class intersections in British women's leadership experiences. *Educational Management Administration & Leadership, 44*(6), 917-935.

Skrla, L. (2003). Normalized femininity: Reconsidering research on women in the super in tendency. In M.D. Young,& L. Skrla (Eds.). *Reconsidering feminist research in educational leadership*(pp. 247- 264). Albany, NY: State University of New York Press.

Smit, B. (2013). Female leadership in a rural school: A feminist perspective. *Studies Tribes Tribals, 11*(1), 89-96.

Tharenou, P. (2001). Going up? Do traits and informal social processes predict advancing in management?.*Academy of Management Journal, 44*, 1005-1017.

Timmers, T. M., Willemsen, T. M.,& Tijdens, K. G. (2009). Gender diversity policies in universities: A multi perspective framework of policy measures.*Higher Education, 59*(6), 719–735.

Van Knippenberg, D., Van Knippenberg, B., De Cremer, D., & Hogg, M. A. (2004). Leadership, self, and identity: A review and research agenda. *The Leadership Quarterly, 15*(6), 825- 856.

Vinnicombe, S.,& Singh, V. (2002). Sex role stereotyping and requisites of successful top managers. *Women in Management Review, 17*(3-4), 120-130.

Weiner, G. (2005). *The Nation Strikes Back: Recent Influences on Teacher Education, in Europe*. Paper presented at the symposium Educational Reform and Teachers, Japan, 12-13 November 2005, Tokyo: Hitotsubashi University.

Willemsen, T. M. (2002). Gender typing of the successful manager- a stereotype reconsidered. *Sex Roles, 46*(11-12), 385-391.

Young, M. D.,& McLeod, S. (2001). Flukes, opportunities, and planned interventions: factors affecting women's decisions to become school administrators. *Educational Administration Quarterly*, *37*(4), 462-50.

Attitudes and views of Primary Education Teachers on Gender Stereotypes and Equality Issues

Abstract

The purpose of this project was to examine gender stereotypes, attitudes and views of primary school teachers on gender equality. The survey involved 150 primary school teachers (125 women and 25 men), of various ages and specialties working in schools inside and outside the Greek territory. For the purposes of the survey, the Sex-Role Egalitarianism Scale [SRES]-Form B was awarded. Analysis of the data showed a significant effect on gender ($p<0.05$) with female teachers scoring higher on gender equality issues. A significant effect was also observed for age ($p<0.05$), with younger teachers showing less stereotypical views than older teachers. However, a significant impact was not found on teachers' specialization in gender equality. In the Greek educational area, stereotypical perceptions of gender roles are expressed, despite the fact that it is an environment that lends itself to the creation of equal relationships and non-discriminatory attitudes.

Keywords: Teachers, Gender, Eequality, Stereotypes

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1. Introduction

Gender issues and questions about the existence of equality between them raise the attention of the international research and scientific world. The literature review shows that gender discrimination stems from social rather than biological factors (Athanasiou, 2006). Research has shown that beliefs about gender roles are formed within the family context and are strengthened and defined in the context of the educational process (Grigoriou, Chroni, Hantzigeorgiadis, Zourbanos & Theodorakis, 2011). Children, from pre-school age, form the patterns of gender roles within the family environment, which are reinforced by the advent of children in the school context, as they enjoy social acceptance (Deligianni-Kouimtzis, 2008). According to a survey of 396 students which examined the attitudes of students on gender equality, the female students are more receptive and positively approached with issues of change towards social equality, with regard to male students presented as less liberal (Gregory et al., 2011). As the educational sector has historically been a professional space accessible for women, which meet in this area with the same frequency as men, it is possible to compare sectors within the profession for any racial discrimination (Frosi, Kouimtzis, & Papadimos, 2001). Within the educational framework there is the following contradiction: the conservative character and hierarchical structure of the education system favour the consolidation of traditional gender roles, while at the same time the education system is the basic structure for eliminating gender diversity (Frosi, et al., 2001). Moreover, the education sector tends to be seen as particularly conservative, with teachers more easily adopting structures related to gender roles (Pavlou & Vitsilaki, 2006). Finally, according to the literature, older teachers compared to women and younger teachers present more strong stereotypical attitudes and opinions, with the broader education industry giving stereotypical traits to gender character (Moshe & Gina, 2001; Natsopoulou & Gianoula, 1996).

2.Research questions

The research tried to answer the following questions:

1. Is the gender of the educational factor shaping views on gender stereotypes?
2. Does the age of the teachers affect their attitude to gender equality?
3. Does the specialization of teachers working in Primary Education differentiate their views on gender equality?

3.Methodology

Quantitative research was carried out. The population of this survey was active male and female primary teachers of different ages. The sample size was 150 teachers, including 25 men and 125 women. The survey was attended by permanent teachers, substitute teachers, foreign language teachers and teachers of different specialties. The majority of the sample teaches in school units all over Greece, while teachers from schools abroad participated in the survey.

3.1.Tools

For the research was used the Greek version of the Gender Equality Questionnaire - Version B (Sex-Role Egalitarianism Scale [SRES]-Form B, King & King, 1993). The greek language questionnaire was adapted by I. Tsaousis (2008). For the purpose of this survey, one of the five sub-scales of the questionnaire was used, which focuses on education and aims to evaluate the attitudes and views of primary education teachers on gender equality issues. Participants were asked to express their degree of

agreement or disagreement on each of the questions given using a 5-stage Likert scale, ranging from 1 to 5, with 1 absolute agreement to 5 absolute disagreement, while the intermediate option implies neutrality. If the participant scores high on non-stereotypical views, it implies a more equal attitude towards both sexes. If he scores high on stereotypical perceptions it means less egalitarianism. The reliability index (cronbach's alpha) for the SRES questionnaire is 0.83 on the education scale, with the corresponding index for the overall questionnaire being 0.96.

3.2 Research Process

The survey was carried out over a period of one month, from 15 November 2019 to 15 December 2019 using the opportunity sample method. The questionnaires were constructed with the Google forms tool. Sent by email with url attached link to teachers' e-mails. The form was completed online for automatic collection of replies and faster data processing. The questionnaires were anonymous and the participants took part voluntarily, following assurances about the confidentiality of their responses.

3.3 Statistical Analysis

In order to detect the factors (gender, age, specialty) that may affect teachers' perceptions of Gender Equality, the method of regression for ordinal regression was applied for each question concerning teachers' perceptions of individual ones. For the distribution of descriptive characteristics and questionnaire responses, the absolute and relative frequencies were calculated. As a dependent variable, respondents' answer to each of the questions about perceptions was used, as measured with Likert questions, with five values (1=I totally agree, 2=I agree, 3=Neutral, 4=Disagree, 5=I totally disagree). The differences (p) for all the indicators used were considered statistically significant from the level of 5% ($p<0.05$). The statistical analysis of the data was carried out using the Statistical Software SPSS (Version 25).

4. Results

With regard to the descriptive characteristics of the 150 teachers who took part in the survey, the majority of the sample (83.3%) were women, while in terms of age 50% of teachers belonged to the 23-30 age group. Most respondents to the survey were Primary teachers (44%). The first research question presents the gender segregation (male - female) of the teachers surveyed and records their most frequent responses on their perceptions of gender equality. In particular, in the question of whether men and women are equally suitable for a business career, the majority of women (91.2%) replied that they strongly agree, with the men from whom they fully agreed only 52% ($p=0.000$). Significantly lower proportion of male teachers (36%) compared to their female colleagues (80.8%) ($p=0.000$), they strongly agree that women are as capable as men in making business decisions. Depending on the question of whether a female manager deserves the same respect as a male manager, 60% of men strongly agreed with this view compared to the significantly higher percentage (92.8%) and the number of women in the labour court, were women teachers who strongly agreed ($p=0.000$). In addition, a similar percentage difference is observed in the question, in which women (93.6%) they are fully in agreement with the view that men and women should have the same opportunities for education, compared to 60% of men ($p=0.000$). The above results confirm the original alternative hypothesis that teachers' gender influences their attitudes and views on gender equality issues and, in particular, that women will achieve higher rates of perceptions of equality.

On the second research question, teachers' most frequent responses are recorded by age group. Gender equality differences were observed among younger and older teachers. In particular, with regard to the view that promotions should be based on the value of individuals and not on their gender, 94.7% of people in the 23-30 age group said that they fully agree, while of those in the over-50s, only half of them (50%) (p=0.003). The same rates of responses (94.7% at ages 23-30 and 50% at the age of 50) were also noted in the view that men and women should have the same opportunities for education (p=0.003). As for the perception that women are as capable as men running a business, 74.7% of younger teachers replied that they fully agree, while a smaller proportion (20%)was observed at the oldest age group (p=0.003). Statistically significant difference (p=0.003) was also observed in teachers' view of whether studying fine arts (drama or dance) can offer the same satisfaction to both a man and a woman. More specifically, 63 people (84%) agreed with the 23-30-year-old group of 23-30 years. the over-50s agreed with this view only 4 people (40%). The findings of the research are consistent with the original hypothesis that as gender and age shape teachers' views on equality issues and that older teachers exhibit more stereotypical perceptions.

As regards teacher specificity and the differentiation of their attitudes to equality, there are no statistically significant differences in respondents' responses. The absence of statistical significance rejects the third research question that the specialization of teachers (kindergarten teachers, primary teachers, specialty teachers) would diversify their attitudes to gender equality.

5. Discussion - Conclusions

This study examined the impact of gender, age and specialisation on perceptions of primary school teachers on gender equality issues. In general, as expected, female teachers had a more positive attitude towards equality between men and women than male teachers. Younger teachers were similarly placed compared to older teachers, who have more stereotypical views. On the other hand, it was observed that the field of education did not appear to affect teachers' attitudes to gender equality. The fact that female teachers were more positive on gender equality issues than male teachers is consistent with the research findings of Gregory et al., (2011). In their survey, a sample of 396 students of different years of study and field of study looked at their attitudes to gender roles in equality. According to the survey, it was observed that students had a more positive attitude than students. This shows that women are presented more positive and more open about the issues of change that they intend in an equal society, while men appear more closed (Manoliadis, Kourtis & Papadopoulos, 2009).

At the same time, this difference may be due to the fact that in recent decades women have gained multiple roles, as apart from housewives and mothers, they enter the labour market. The research of Moschovakos, Kantarakis, Pagaki, Stamatelopoulou & Tsioga (2008), explored the views of teachers about their workplace, the impact of the parent ing and social environment on the choice of their profession, their ambitions and expectations for the future of education and the possibilities and difficulties in their professional development, confirms that gender affects the professional development of the individual. Of the 31 women who participated, only one woman holds a managerial position, one holds a deputy headteacher position and a school counselor position. These figures reveal the difficulty of developing female teachers into higher education positions. Also in

Secondary Education only one woman holds a managerial position in a High School and one held a post of Principal formerly. In addition, in the 1995 Study of Maragkoudakis (1995) for the 1994-95 school year the proportion of female teachers in the position of Head of Directorate was 3.5%, but men held 96.5%. In Office Chief positions, women were 5.8%, while men were 94.2%. Similarly, research by Pavlou, Tsaousis, Vryonides & Vitsilaki (2008) demonstrates how gender affects the way men and women perceive equality between them.

This survey involved 440 students and students from the University of Rhodes as well as 233 participants, men and women, from the general population of older age and different levels of education. It has therefore been found that women, whether they are students or older, adopt more equality relationships in relation to gender roles in terms of their personal contacts and relationships within society. Finally, the survey carried out by Tatar & Emmanuel (2001) examined the difference in attitudes, views and behaviour between primary and secondary school teachers on gender and equality issues and the difference between male and female teachers. There were 221 teachers, men and women, from 17 schools (primary and secondary schools) who were of various specialties. In general, this research has shown that male and female teachers are slowly tending to "tolerate" and be more receptive to issues of parity between them. This is probably due to the development of the last few decades which is a reference to an equal society between men and women. However, female teachers continue to be more willing and open to creating equal relationships with men. It was also observed that male primary school teachers are more positive about equality issues freed from stereotypical perceptions than teachers of other levels who are closed on such issues. This is probably due to the fact that the proportion of male primary school teachers is lower than teachers at other levels. So when a man chooses to pursue the profession of primary school teacher, he is free from stereotypical notions that want women to follow this profession more.

Age was the second variable that gave some variations in the perceptions of male and female teachers on gender equality issues. The age of teachers seemed to influence these attitudes and it was even observed that the younger the teachers, the more positive views without racial stereotypes possessed. Bibliographic literature has shown that views on gender equality are directly related to age. It is generally accepted that the family and the wider social environment of the individual, from the first childhood, form patterns and perceptions of both sexes. Gradually these perceptions become established and over time they become more powerful. However, according to the survey of Gregory et al., (2011) it appeared that the age of the students did not affect their attitude towards a more positive or negative direction.

This is very likely due to their very limited period of time in the education sector. In contrast, our research found that half of teachers over the age of fifty who completed the questionnaire felt that promotions of individuals should be based on their gender. The impact of age on gender issues was also confirmed by the Ford & Donis (1996), study on the attitude of both sexes towards sexual harassment in a professional space. In particular, it appeared that women are significantly less tolerant of men in the face of incidents of sexual harassment. At the same time, of course, as far as age is concerned, it is noted that women under the age of 40 were significantly less tolerant of sexual harassment than older women. In contrast, male employee tolerance slumps to sexual harassment gradually to the age of 50, after which their tolerance to sexual harassment begins to increase significantly. Therefore, it seems that age is negatively related to attitudes of gender equality. In relation to the specialization of teachers and the differentiation of their attitudes to equality, there are

no significant differences in the responses of the sample. The lack of statistical significance rejects the original research hypothesis that the specialty of teachers (kindergarten teachers, Primary teachers, specialty teachers) differentiates their attitudes to gender equality. This contrasts with the research of Gregory et al., (2011), which involved students with specialties in primary education and physical education and sport. There it appeared that primary school students had higher rates of equality than other students of other specialties.

It is clear that what educational environment contributes significantly to the image of society, since it is a vector of knowledge and spiritual cultivation of the individual. Thus, it is believed that the educational space can play an active role in establishing a fairer attitude towards the sexes, naturally pronouncing the right supplies and stimuli to future generations.

6. References

Athanasiou, A. (2006). *Feminist theory and cultural criticism*. Athens: Nissos Publications.

Grigoriou, S., Chroni, S., Hadjigeorgiadis, A., Zourbanos, N. & Theodorakis, I. (2011). Attitudes of Greek students and students towards equality between the two Sex. *Searches in Physical Education and Sports*, 9(1):14-23.

Deligianni – Koumtzi, V., Markoulis, D., Gondida – Bamni, E., Kioseoglu, G., Psalti, A., Koumtzi, E. & Baka, A. (2008). Educational and Professional Options of Adolescents: Exploring perceptions of issues gender equality of the Greek school community (pupils, teachers, parents) report the results of the survey at national level Level. Quality Research, Aristotle University of Thessaloniki.

Ford, C. & Donis, F. J. (1996). The relationship between age and gender in workers' attitudes toward sexual harassment. *Journal of Psychology, 130,* 627-633.

King, L. A., & King, D. W. (1993). *Sex-role egalitarianism scale manual.* USA: Sigma Assessment Systems, Inc.

Manoliadis, I., Kourtis, A., & Papadopoulos, K., (2009). Sexual Harassment in the Workplace and Its Dimensions in Modern Greek Reality. 1st Panhellenic Scientific Conference of Doctors and Health specialists. Thessaloniki.

Maragkoudaki, E. (1995). Gender stereotypes in preschool children's books. In Education and Equal Opportunities, Conference Proceedings, Athens 7-9 April 1995, Ministry of The Presidency of the Government, G.. C.. I., K.E.Th.I., Athens.

Moshe, T. & Gina E. (2001). Teachers' Perceptions of their students' Gender roles. *The Journal of Educational Research,* 94(4), 215-224.

Moschovakou, N., Kantaraki, M., Pagaki, M., Stamatelopoulou, T., & Tsiogas, P. (2008). By Gender Occupational Segregation (Vertical and Horizontal): Discrimination and Inequalities against women in education. Athens: Centre for Research on Equality Issues.

Natsopoulou, T., & Giannoula, S. (1996). Investigation of stereotypes about Sex. *Modern Education*, 89, 67-72.

Pavlou, V., Tsaousis, I. Vryonides, M., & Vitsilaki, C. (2008) Assessing the Dimensionality and other Psychometric Properties of a Greek Translation of the Sex-Role Egalitarianism Scale (Form B). *Sex Roles*, 59, 787-799

Pavlou, V. & Vitsilaki, C. (2006). Psychometric evaluation of Sex-Role Egalitarianism Scale with teacher population in Greece. *The International Journal of Interdisciplinary Social Sciences, 1*, 1-8.

Tatar, M., & Emmanuel, G. (2001). Teachers' perceptions of their students' gender roles. *The Journal of Educational Research*, 94(4), 215-224.

Frosi, L., Koumtzis, E., Papadimou, Ch. (2001). The sex factor and school primary and secondary education. Athens: Centre for Research on Equality Issues roles. *The Journal of Educational Research*, 94(4), 215-224.

Table 1 : Descriptive Characteristics of the Sample

Characteristic (n, %)		**Total Sample (n=150)**
Gender	*Male*	25 (16,7%)
	Female	125 (83,3%)
Age	*23-30*	75 (50%)
	31-40	46 (30,7%)
	41-50	19 (12,7%)
	Up 50	10 (6,7%)
Specialization	*Kindergarten Teacher*	39 (26%)
	Primary Teacher	66 (44%)
	Specialty Teacher	45 (30%)

Table 2: Results of Attitudes in relation to Gender

Questions*	**Characteristic (n, %)**	**Male (n=25)**	**Female (n=125)**	**difference (p-value)**
1	Disagree	4 (16%)	40 (32%)	,944
2	Strongly Agree	15 (60%)	111 (88,8%)	,001
3	Strongly Agree	5 (20%)	50 (40%)	,000
4	Strongly Agree	15 (60%)	115 (92%)	,000
5	Strongly Agree	13 (52%)	114 (91,2%)	,000
6	Strongly Disagree	7 (28%)	83 (66,4%)	,000
7	Strongly Agree	9 (36%)	101 (80,8%)	,000
8	Strongly Disagree	12 (48%)	98 (78,4%)	,001
9	Strongly Disagree	8 (32%)	79 (63,2%)	,000
10	Strongly Disagree	8 (32%)	40 (32%)	,042
11	Agree	2 (8%)	46 (36,8%)	,001
12	Strongly Agree	15 (60%)	117 (93,6%)	,000
13	Strongly Disagree	10 (40%)	73 (58,,4%)	,006
14	Strongly Agree	15 (60%)	116 (92,8%)	,000
15	Strongly Agree	15 (60%)	117 (93,6%)	,000
16	Disagree	3 (12%)	39 (31,2%)	,188
17	Disagree	7 (28%)	42 (33,6%)	,024
18	Strongly Agree	8 (32%)	86 (68,8%)	,000
19	Strongly Agree	5 (20%)	54 (43,2)	,000
20	Strongly Disagree	8 (32%)	63 (50,4%)	,017
21	Disagree	6 (24%)	32 (25,6%)	,099
22	Strongly Agree	10 (40%)	103 (82,4%)	,000
23	Strongly Disagree	7 (28%)	85 (68%)	,000
24	Strongly Disagree	14 (56%)	88 (70,4%)	,109
25	Strongly Disagree	11 (44%)	68 (54,4%)	,065
26	Strongly Disagree	9 (36%)	90 (72%)	,000

27	Strongly Disagree	8 (32%)	63 (50,4%)	,000
28	Strongly Disagree	9 (36%)	80 (64%)	,007
29	Strongly Disagree	11 (44%)	96 (76,8%)	,001
30	Nor Agree/Nor Disagree	10 (40%)	50 (40%)	,178
31	Agree	4 (16%)	44 (35,2%)	,001
32	Strongly Agree	8 (32%)	92 (73,6%)	,000
33	Strongly Agree	14 (56%)	102 (81,6%)	,004
34	Strongly Agree	15 (60%)	107 (85,6%)	,003
35	Strongly Agree	11 (44%)	101 (80,8%)	,000

* The questions are described in detail in the appendix

Table 3: Results of Attitudes in relation to Age

Questions*	**Characteristic (n, %)**	**23-30 (n= 75)**	**31-40 (n=46)**	**41-50 (n=19)**	**Up to 50 (n=10)**	**difference (p-value)**
1	Disagree	21 (28%)	15 (32,6%)	7 (36,8%)	1 (10%)	,556
2	Strongly Agree	66 (88%)	41 (89,1%)	14 (73,7%)	5 (50%)	,052
3	Strongly Agree	30 (40%)	17 (37%)	5 (26,3%)	3 (30%)	,472
4	Strongly Agree	69 (92%)	41 (89,1%)	14 (73,7%)	6 (60%)	,020
5	Strongly Agree	67 (89,3%)	40 (87%)	14 (73,7%)	6 (60%)	,039
6	Strongly Disagree	49 (65,3%)	23 (50%)	12 (63,2%)	6 (60%)	,333
7	Strongly Agree	57 (76%)	34 (73,9%)	14 (73,7%)	5 (50%)	,239
8	Strongly Disagree	61 (81,3%)	32 (69,6%)	12 (63,2%)	5 (50%)	,040
9	Strongly Disagree	45 (60%)	26 (56,5%)	11 (57,9%)	5 (50%)	,308
10	Strongly Disagree	26 (34,7%)	15 (32,6%)	4 (21,1%)	3 (30%)	,685
11	Agree	22 (29,3%)	14 (30,4%)	9 (47,4%)	3 (30%)	,531
12	Strongly Agree	71 (94,7%)	42 (91,3%)	14 (73,7%)	5 (50%)	,003
13	Strongly Disagree	46 (61,3%)	26 (56,5%)	8 (42,1%)	3 (30%)	,017
14	Strongly Agree	70 (93,3%)	41 (89,1%)	14 (73,7%)	6 (60%)	,023
15	Strongly Agree	71 (94,7%)	42 (91,3%)	14 (73,7%)	5 (50%)	,003
16	Disagree	18 (24%)	17 (37%)	6 (31,6%)	1 (10%)	,003
17	Disagree	24 (32%)	16	7 (36,8%)	2 (20%)	,011

			(34,8%)			
18	Strongly Agree	55 (73,3%)	25 (54,3%)	11 (57,9%)	3 (30%)	,017
19	Strongly Agree	37 (49,3%)	17 (37%)	4 (21,1%)	1 (10%)	,005
20	Strongly Disagree	41 (54,7%)	20 (43,5%)	7 (36,8%)	3 (30%)	,342
21	Disagree	18 (24%)	10 (21,7%)	6 (31,6%)	4 (40%)	,043
22	Strongly Agree	61 (81,3%)	34 (73,9%)	13 (68,4%)	5 (50%)	,104
23	Strongly Disagree	53 (70,7%)	24 (52,2%)	11 (57,9%)	4 (40%)	,023
24	Strongly Disagree	55 (73,3%)	30 (65,2%)	10 (52,6%)	7 (70%)	,218
25	Strongly Disagree	43 (57,3%)	24 (52,2%)	8 (42,1%)	4 (40%)	,103
26	Strongly Disagree	54 (72%)	28 (60,9%)	11 (57,9%)	6 (60%)	,124
27	Strongly Disagree	41 (54,7%)	21 (45,7%)	7 (36,8%)	2 (20%)	,013
28	Strongly Disagree	48 (64%)	29 (63%)	11 (57,9%)	1 (10%)	,009
29	Strongly Disagree	59 (78,7%)	31 (67,4%)	10 (52,6%)	7 (70%)	,098
30	Nor Agree/Nor Disagree	29 (38,7%)	20 (43,5%)	7 (36,8%)	4 (40%)	,033
31	Agree	27 (36%)	11 (23,9%)	6 (31,6%)	4 (40%)	,280
32	Strongly Agree	56 (74,7%)	32 (69,6%)	10 (52,6%)	2 (20%)	,003
33	Strongly Agree	64 (85,3%)	36 (78,3%)	12 (63,2%)	4 (40%)	,007
34	Strongly Agree	67 (89,3%)	38 (82,6%)	13 (68,4%)	4 (40%)	,005
35	Strongly Agree	63 (84%)	34 (73,9%)	11 (57,9%)	4 (40%)	,003

* The questions are described in detail in the appendix

Table 4: Attitude Results in relation to the Specialty

Questions*	**Characteristic (N, %)**	*Kindergarten Teacher* **(n= 39)**	*Primary Teacher* **(n=66)**	*Specialty Teacher* **(n=45)**	**difference (p-value)**
1	Disagree	11 (28,2%)	20 (30,3%)	13 (28,9%)	,531
2	Strongly Agree	36 (92,3%)	57 (86,4%)	33 (73,3%)	,072
3	Strongly Agree	16 (41%)	23	16 (35,6%)	,195

			(34,8%)		
4	Strongly Agree	36 (92,3%)	57 (86,4%)	37 (82,2%)	,381
5	Strongly Agree	35 (89,7%)	56 (84,8%)	36 (80%)	,422
6	Strongly Disagree	25 (64,1%)	36 (54,5%)	29 (64,4%)	,518
7	Strongly Agree	30 (76,9%)	45 (68,2%)	35 (77,8%)	,619
8	Strongly Disagree	32 (82,1%)	47 (71,2%)	31 (68,9%)	,268
9	Strongly Disagree	23 (59%)	35 (53%)	29 (64,4%)	,727
10	Strongly Disagree	12 (30,8%)	22 (33,3%)	14 (31,1%)	,730
11	Agree	15 (38,5%)	18 (27,3%)	15 (33,3%)	,599
12	Strongly Agree	37 (94,9%)	58 (87,9%)	37 (82,2%)	,245
13	Strongly Disagree	22 (56,4%)	37 (56,1%)	24 (53,3%)	,884
14	Strongly Agree	37 (94,9%)	58 (87,9%)	36 (80%)	,158
15	Strongly Agree	37 (94,9%)	57 (86,4%)	38 (84,4%)	,318
16	Disagree	13 (33,3%)	16 (24,2%)	13 (28,9%)	,141
17	Disagree	14 (35,9%)	18 (27,3%)	17 (37,8%)	,311
18	Strongly Agree	27 (69,2%)	38 (57,6%)	29 (64,4%)	,368
19	Strongly Agree	20 (51,3%)	22 (33,3%)	17 (37,8%)	,060
20	Strongly Disagree	22 (56,4%)	27 (40,9%)	22 (48,9%)	,307
21	Disagree	8 (20,5%)	17 (25,8%)	13 (28,9%)	,963
22	Strongly Agree	34 (87,2%)	44 (66,7%)	35 (77.8%)	,088
23	Strongly Disagree	30 (76,9%)	36 (54,5%)	26 (57,8%)	,052
24	Strongly Disagree	27 (69,2%)	45 (68,2%)	30 (66,7%)	,871
25	Strongly Disagree	23 (59%)	33 (50%)	23 (51,1%)	,407
26	Strongly Disagree	28 (71,8%)	41 (62,1%)	30 (66,7%)	,700
27	Strongly Disagree	20 (51.3%)	32 (48,5%)	19 (42,2%)	,539
28	Strongly Disagree	25 (64,1%)	37	27 (60%)	,631

			(56,1%)		
29	Strongly Disagree	30 (76,9%)	45 (68,2%)	32 (71,1%)	,607
30	Nor Agree/Nor Disagree	17 (43,6%)	23 (34,8%)	20 (44,4%)	,970
31	Agree	15 (38,5%)	19 (28,8%)	14 (31,1%)	,025
32	Strongly Agree	33 (84,6%)	36 (54,5%)	31 (68,9%)	,017
33	Strongly Agree	33 (84,6%)	49 (74,2%)	34 (75,6%)	,391
34	Strongly Agree	35 (89,7%)	51 (77,3%)	36 (80%)	,272
35	Strongly Agree	33 (84,6%)	45 (68,2%)	34 (75,6%)	,206

*The questions are described in detail in the appendix

Appendix

Question 1	There are many jobs in which it is better to hire women than men
Question 2	It is just as important for fathers to go to their children's school activities as it is for mothers.
Question 3	Home economics should be chosen equally by students
Question 4	Postgraduate studies are just as important for women as they are for men
Question 5	Men and women are equally suitable for business careers
Question 6	Women should not feel as compelled as men to study
Question 7	Women are just as capable as men in making important business decisions
Question 8	A math teacher should expect more from a male student than from a female student
Question 9	Business studies are more suitable for boys than for girls
Question 10	Education for the position of secretary is more appropriate for women than for men
Question 11	Vocational school counselors should encourage female students to pursue technological studies, such as Engineering
Question 12	Promotions should be based on the value of individuals and not on their gender
Question 13	Women should not take men's jobs in times of economic crisis
Question 14	A female director deserves the same respect as a male director
Question 15	Men and women should have the same opportunities for education
Question 16	Girls are more studious than boys
Question 17	Girls are more reliable than boys in doing their homework
Question 18	Women should have the same opportunities as men to pursue careers in the industry
Question 19	Kindergarten Schools should receive an equal number of male and female students
Question 20	Boys take their education more seriously than girls
Question 21	Men and women differ in the extent to which they want new

	challenges in their work
Question 22	Men and women should have equal opportunities for training in scientific professions
Question 23	Female bosses are less capable than male bosses in motivating their subordinates
Question 24	Male teachers are not as effective as female teachers
Question 25	The "entry" of women into traditional men's professions must be discouraged
Question 26	Vocational training that has a high financial cost should be provided mainly to men
Question 27	It is wrong for a man to choose a traditionally female profession
Question 28	It offers more satisfaction when you teach girls than boys
Question 29	Women are not as dedicated to their profession as men
Question 30	More men should be studying pedagogy
Question 31	More women are needed in key positions in the industry
Question 32	Women are just as capable as men in running a business
Question 33	Gender should not be a reason for rejection of any job
Question 34	Equal employment opportunities regardless of gender are a value we should all support
Question 35	Studies in the fine arts, such as drama or dance, can offer the same satisfaction to both a man and a woman.

The Cost of the Occupational Risk at the Enterprise Level

Abstract:
The authors of the present article propose a model for the estimation of the annual cost of the occupational risk in an enterprise. The cost is analysed in two factors: one «independent» of the annual number of the work accidents and the other totally «dependent» on it. Each one of these factors is further analysed in others. The first factor is further analysed in two factors: one concerning the enterprise compliance to the national minimum occupational safety and health standards set by the law and another proactive factor concerning the improvement of the safety performance. The dependent factors estimate the losses in human capital and equipment, as well as the administrative and judicial losses of each one accident occurring in the enterprise. The model is based in the economic value of several factors except the human life. The proposed model is distinguished from other similar once, because it goes further than the cost estimation of the work related accidents, as it gives to its users the ability to estimate the cost of the enterprise's policy for the occupational risk prevention. It can be used in every enterprise, large or small, private or public. Additionally, it constitutes a good basis for electronic programming and statistical analysis.

Key-Words: Occupational Risk, Enterprise, Disease Cost, Accident Cost

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1. Introduction

How much does an occupational accident/disease cost? Who pays for this cost?
There is a theory, according to which «safety does not connect to cost». This theory is based on the fact that the cost of human life cannot be appraised (the case of a fatal occupational accident), nor the person who suffers (the rest of the cases concerning occupational accidents/diseases). Consequently, there is no employer or scientist who is in the position to put a price on these matters.

Regardless of the magnitude of the economic consequences of an occupational accident/disease, we are far from estimating all the costs related to it. There are though, some indicators that show the size of the problem. Such indicators are the lost working days, the lost wages, hospital expenses, the comparison of the losses to the Gross National Product (GNP), etc.

A long and really very interesting discussion is still open among scientists, policy makers and economists regarding the estimation of all these parameters and the adoption of a model measuring them. Several theories have been proposed. The theory of direct and indirect losses of an occupational accident and the mathematical relation between these two factors is very well known. Another famous approach is the cost – benefit analysis, i.e. the estimation of the cost of accidents versus the benefits gained from measures preventing them. It is a popular argument for the policy makers to push the employers to undertake preventive measures in their companies.

Another interesting question is "Who pays the accident costs?". It is accepted that there are 4 groups paying different costs:

- the employers and their companies,
- the victims of the accidents,
- the insurance organisations,
- the national economy.

2. New needs and challenges for the companies

Although it is impossible to estimate exactly the costs that each of the above groups pay every year, it is accepted that the relevant amounts are really huge, especially compared to the Gross National Product. This is one of the reasons that the European Union has adopted the reduction of the number of the occupational accidents as one of the major targets of its policy for the period 2001 – 2006. One of the means to achieve this, is the implementation of the minimum occupational safety and health (OSH) requirements set by European law (directives). All the European Member – States have the obligation to set national laws adopting at least the minimum OSH requirements in all the workplaces and to dispose the appropriate mechanisms to audit the companies' compliance. So, the company is the shell for the improvement of the OSH conditions.

It is clear that the companies have to spend several amounts of money just for the compliance to the law, regardless of the number of occupational accidents every year. That's why it is of their special interest to have a tool to measure the cost of compliance, plus the cost of accident losses, as well as a safe indication to make decisions about their OSH policy. This tool must estimate all these costs in "real EUROs" on an annual basis. Additionally, the tool has to be easy for use, without indicating complicated mathematical estimations, appropriate for any company, regardless of its size, its proprietary status quo and its productive activity and adjustable to new legislative requirements.

The critical consideration of the contemporary theories and the suggested models for the economic impacts of the occupational accidents, pointed the authors of this article to the proposal of a new model covering all the above mentioned needs.

3. The proposed model

The proposed model is based on the economic evaluation of many sizes except of human life. The American model has been taken into consideration for the calculation of the lost working days (1 fatal accident = 6.000 lost working days). All sizes required for the calculations either exist selfsame in the company or are too easy to be collected.

The model is analysing the company's cost into two components:

- one **independent of the number of occupational accidents/diseases**, related to the company's legal obligations and its OSH policy and
- another **directly proportional to the number and severity of occupational accidents/diseases**, which can be calculated specifically per occupational accident/disease.

The first component is further analysed into two other ones:

- the **fixed** component, also named cost of **«preservation of the minimum OSH requirements».** It includes:
  - the **initial investments** for the incorporated safety in the establishments and the operation of the business,
  - the **operational cost of the OSH management system** in compliance to the minimum OSH requirements (for example, the annual salaries of the safety officer and the occupational doctor that the company is obliged to hire is a cost of this category). Obviously, any new obligation imposed by the national legislation or other company's engagements can be added for the completion of the component (cost of the **«adjustment»** to new requirements). This capability of the proposed model makes it flexible and ensures its duration, since there is no need for the company to change the model, if new obligations are initiated.
- the **«proactive»** component, also named cost of **«safety performance improvement».** It includes the cost of all the activities undertaken by the company in order to plan and apply a safety program that will decrease accidents. This can be done in scheduled time intervals (every 5 years for example), after the evaluation of the existing OSH system, taking into consideration the new scientific data. The costs of the this category include:
  - planning of a new OSH program,
  - personnel for the implementation and the inspection of the grogram,
  - employees' information,
  - employees' training,
  - employees' participation in the company's OSH activities,
  - employees' representation in the OSH Committee,
  - purchase, maintenance and replacement of Collective Protective Equipment,
  - purchase, maintenance and replacement of Personal Protective Equipment (PPE),
  - reduced production during the adjustment to the requirements of the program,
  - equipment for the inspection and audit of the working conditions,
  - monitoring, collection and analysis of the results of the safety program implementation.

The second component, depending on the number and severity of occupational accidents/diseases, is composed of losses in:

- **Workforce**
  - victim's day-wages of the days on that s/he does not provide any work, including the day of the accident (percentage)
  - medical care
  - victim's rehabilitation
  - judicatory compensation to the victim
  - funeral expenses (in case of victim's death)
  - retirement payment to the victim or the persons depending on him
  - loss of victim's qualifications, experience, skills
  - time of rescue personnel
  - victim's replacement by another employee or by overtime work
  - personnel wages for repairing of the damage
  - time loss of other employees (management, public relations) for the completion of accident record forms, keeping files, investigating and recording of the accident (actions required by the law).
- **Equipment, installations and materials**
  - ruin, damage and loss of equipment, installations and materials
  - repairing and replacing of the damage
  - obsolescence of the equipment
  - loss of rescue equipment
  - use of emergency equipment
- **Judicatory and Administrative Expenses**
  - fees for legal action
  - judicatory expenses
  - administrative penalties and fines
  - decrease of productivity and revenues loss, due to the non operation of the engines, the reorganisation of the working program, working in rotation, the replacement of the victims, the low esteem of the personnel
  - operational delays during the accident investigation and the application of corrective actions
  - penalty clause due to production delays
  - stable expenses for accident insurance plus variable insurance expenses related to the number of accidents
  - loss of reputation, prestige and public trust
  - loss of customers
  - decrease of moral
  - disturbance of working peace (work stoppages, strikes).

Every occupational accident/disease does not produce all the above losses. In some cases, several of these losses have zero price. It is of specific importance that all the kind of losses can be estimated in money, with the adoption of some specific conventions for this purpose, and can be calculated one by one for each accident/disease. Generally, these costs are easily determined with standard accounting procedures. For the lost equipment, its age, depreciation and inflation should be taken into consideration. The legal and judicatory expenses, the fines and the increase of the insurance rates can be directly estimated. The loss of public trust can be evaluated by the decrease of sales. Some costs, such as the loss of prestige and

the decrease of moral, are difficult to evaluate in money terms, even though sometimes it can be achieved. The effort of the public relations department to restore the company's prestige is something that can be measured. The decrease of moral can be equalised in money terms to the decrease of production, the highest indicators of absence, the cost of replacement of employees that resign of get fired.

4. Conclusion

The European strategy for the improvement of OSH conditions sets minimum safety requirements and establishes the employers' – companies' obligation for compliance. The companies have a strong interest to estimate not only the annual cost of the occupational accidents/diseases, but, also, the cost of compliance, as well as the cost of safety performance improvement, that is the cost of the OSH policy as a whole. That's why a need for an appropriate calculating tool is risen.

The proposed model has the following advantages:

1. It is independent of the size of business (big or small), its proprietary status quo (public or private) and its productive activity (construction, industry, services).
2. It is connected directly to the occupational accident records.
3. It is suitable for computer programming and statistical process.
4. It does not include complicated mathematical calculations.
5. All its components are comprehensible and can be calculated separately.
6. It gives the ability to estimate separately the cost for compliance (compulsory) and the cost of safety performance improvement (voluntary).
7. It constitutes a solid ground for decision making regarding the company's OSH policy.

5. References

Andreoni: "The cost of occupational accidents and diseases", ILO, German Democratic Republic, 1986.

Crites Thomas R.: "Reconsidering the Costs and Benefits of a Formal Safety Program", Professional Safety, December 1995, p. 28-32.

Everley Mike: "What do accidents cost?", Health and Safety at Work, January 1995, p.12-14.

Ferry Ted: "Modern Accident Investigation and Analysis", J. Wiley Sons, USA, 1988, The cost of Mishaps, p. 5-6.

Fred Manuele: "Workers' compensation cost control through ergonomics", Professional Safety, December 1991, pp. 27-32

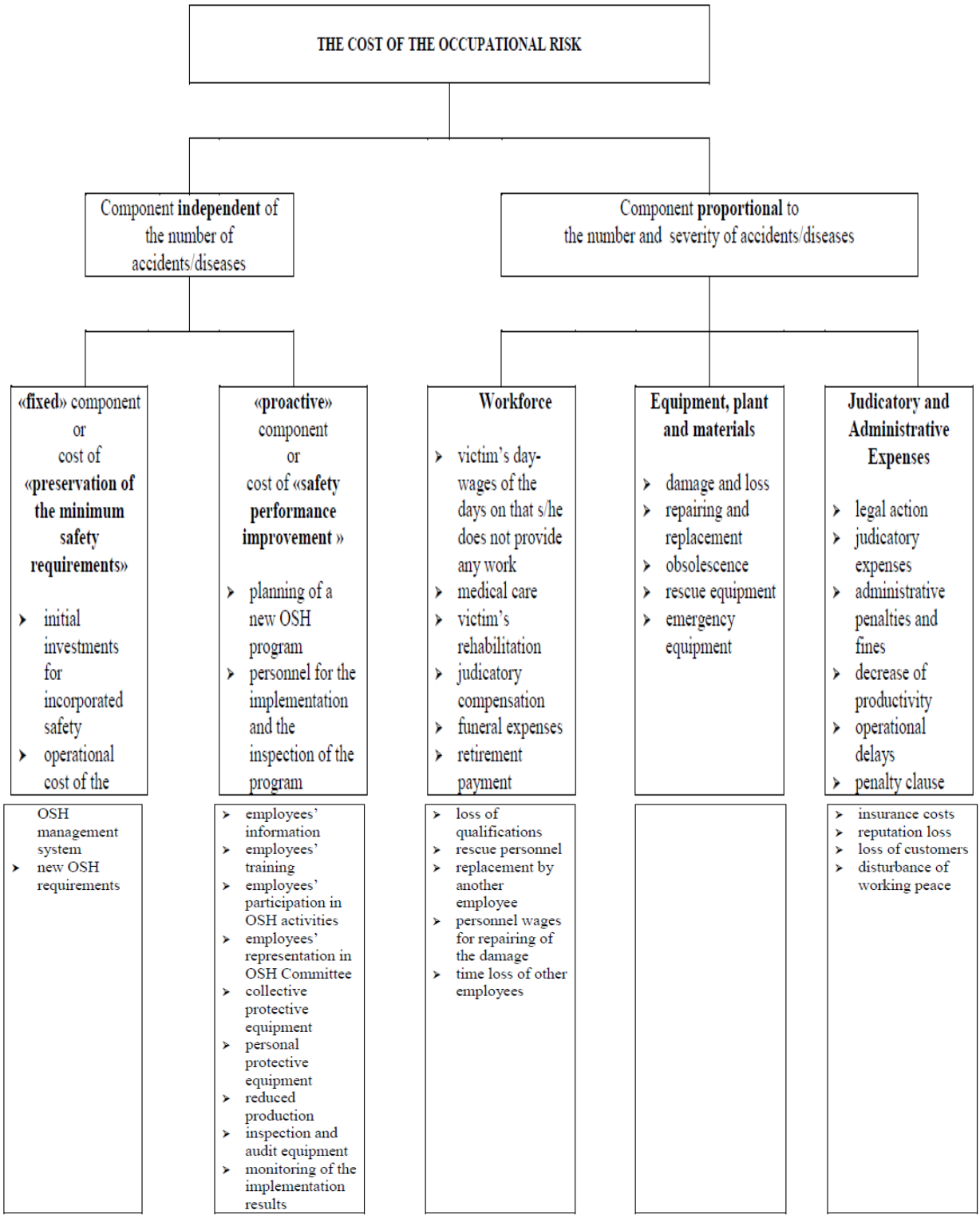
Gottschall Robert: "Safety management and total employee health costs", Professional Safety, July 1990, p. 24-27.

Hammer Willie: "Accident Costs" in "Handbook of System and Product Safety", Prentice-Hall, 1972, USA, p. 27.

ILO: "Accident Cost" in Encyclopaedia of occupational Health and Safety, 3rd Edition, ILO, Geneva, 1983, p. 16-18.

Lammin Susan: "The role of cost-benefit analysis in formulating strategies for improving safety and health at work", The Safety & Health Practitioner, January 1995, p. 18-20.

Lanoie Paul and Tanevas Sophie: "Costs and benefits of preventing workplace accidents: the case of participatory ergonomics", Safety Science, Vol.24, No 3, p. 181-195.


THE COST OF THE OCCUPATIONAL RISK
Component independent of the number of accidents/diseases
Component proportional to the number and severity of accidents/diseases
«fixed» component or cost of «preservation of the minimum safety requirements»
initial investments for incorporated safety
operational cost of the OSH management system
new OSH requirements
«proactive» component or cost of «safety performance improvement »
planning of a new OSH program
personnel for the implementation and the inspection of the program
employees' information
employees' training
employees' participation in OSH activities
employees' representation in OSH Committee
collective protective equipment
personal protective equipment
reduced production
inspection and audit equipment
monitoring of the implementation results
Workforce
victim's day-wages of the days on that s/he does not provide any work
medical care
victim's rehabilitation
judicatory compensation
funeral expenses
retirement payment
loss of qualifications
rescue personnel
replacement by another employee
personnel wages for repairing of the damage
time loss of other employees
Equipment, plant and materials
damage and loss
repairing and replacement
obsolescence
rescue equipment
emergency equipment
Judicatory and Administrative Expenses
legal action
judicatory expenses
administrative penalties and fines
decrease of productivity
operational delays
penalty clause
insurance costs
reputation loss
loss of customers
disturbance of working peace

Supply Chain Management: Policy and Governance Applications

Abstract:
Resource efficiency is a strategic priority of the Europe 2020 Strategy, a policy response to address a wide spectrum of major economic and environmental concerns. Within this spectrum, one of the priority objectives of the 7th EU Environment Action Programme, until 2020, is to 'turn the European Union into a resource-efficient and competitive economy. The spectrum of implemented instruments of research, technology and innovation policy is widely differentiated nowadays, reflecting the scope of institutions and interests involved, stretching from public funding of research institutions over various forms of financial incentives to the conducting of research and experimental development, including the institutions and mechanisms of technology transfer. In many European countries, these instruments dominated the practice or research and technology policy for the last three decades. This paper focuses on the analysis of these topics, focusing on the institutional context in European Union.

Keywords: Productive Efficiency, Innovation and Industrial Policy, Supply Chain Management

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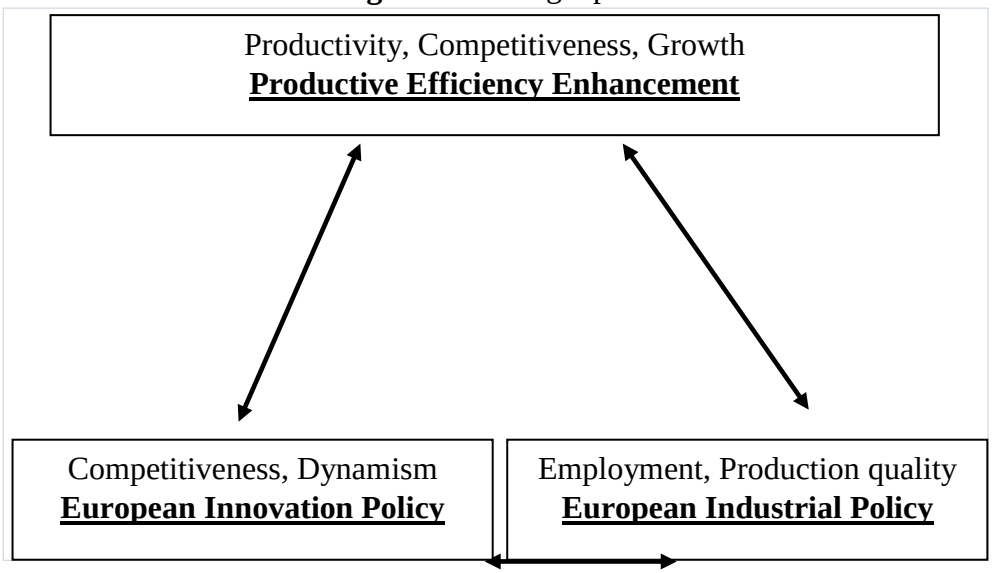
1. Productive Efficiency and Supply Chain Management

As technical efficiency enhancement becomes an increasingly important issue, production must draw on a wide range of production ideas, component technologies and complementary capabilities. Within this framework, it is rather difficult for any single industry to incorporate and take advantage of the relevant technological advances, as well as the underlying industrial and innovation policies. This means that the actions of industries involve the targeted development of specialized knowledge assets, which are integrated from a wider range of knowledge areas (Oh et al, 2009).

Growth and competitiveness become contingent on the ability of firms to compose, establish and maintain external interfaces (Oh et al, 2009), to choose the right mode of governance and to link these effectively to internal knowledge accumulation and capability development. The relationship between productive efficiency and innovation and industrial policy is illustrated in the following Figure (1):

Figure 1: Strategic policies flows



Source: Own Elaboration

European industrial, technology and innovation policies are no longer exclusively in the hands of national authorities: increasingly, national initiatives are supplemented by or even competing with regional innovation policies or transnational programmes, in particular, the activities of the European Union. At the same time, industrial innovation increasingly occurs within international networks. Research, technology and innovation policies of European countries clearly reflected the profiles of their national (and regional) 'innovation systems', understood as the various institutions, corporate actors and processes contributing to industrial and societal innovation.

The innovation policies of the European Union played a noticeable, but not yet a dominant role in the national contexts, at least not in the bigger member states (Battese et al., 2001).

The spectrum of implemented instruments of research, technology and innovation policy is widely differentiated in the meantime, reflecting the scope of institutions and interests involved: it stretches from public funding of research

institutions over various forms of financial incentives to the conducting of research and experimental development in public or industrial research labs, up to the design of an innovation-oriented infrastructure, including the institutions and mechanisms of technology transfer. In many European countries, these instruments dominated the practice or research and technology policy for the last three decades.

As further instruments one could mention efforts to guide public demand, measures in education and further training and the regulatory possibilities available. In the 21st century, though, the national and (regional) innovation systems are experiencing revolutionary shockwaves: the growing pull of internationalising economic relationships has mixed up traditional regional or national divisions of work between industrial enterprises, educational and research institutions as well as administration and politics, and it debased many of their traditional strengths. Internationalisation, however, has so far not led to a uniformity of the national innovation systems, which would finally mean their abolition. The various national and regional innovation cultures and related policy arenas react very differently, which partly leads them into crises, partly stabilises, but partly also reveals unexpected, novel chances in a transformed international context. At the same time, European transnational innovation policies have been entering the stage, increasingly since 1985, nowadays covering the whole range of instruments (Battese et al., 2001).

As a consequence, industrial policies were defined, aiming mainly to the competitive growth of the European industry, focusing on the following objectives:

- Accelerating the adaptive process of the industry to the structural changes;
- Developing an environment in the favour of initiative and development of enterprises;
- Encouraging the favourable environment for business cooperation;
- Favouring the industrial potential of the research, technologic development and innovation policies.

The following table presents the main priorities regarding the effectiveness of innovation and industrial policy implementation:

Table 1: Policy Effectiveness Priorities

Priority	Means and actions
• give priority to innovation and enterprise • ensure full employment • ensure an inclusive labor market • connect European Union • protect the environment	• creating closer links between research institutes and industry, developing conditions favorable to R&D, improving access to finance and know-how and encouraging new business ventures; • emphasizing the need to open up employment opportunities, to increase productivity and quality at work and to promote lifelong learning; • reducing unemployment and disparities in access to employment; • promoting closer integration by improving transport, telecommunications and energy networks; • stimulation of innovation, and introducing new technologies, for example, in energy and transport.

Source: Own elaboration

The difficult fiscal environment sets limits to policy action, but robust growth will reduce the burden of public deficit and debt, in line with the goals of the Stability and Growth Pact. For this an environment that favours new ideas and new businesses is required. Innovation is the primary driver of a successful and sustainable industrial policy. A strong lead in R&D and innovation is Europe's key competitive advantage and of central importance in finding solutions to economic challenges. With increased globalisation, one can only hope that industry will be an engine for the spreading of social progress, environmentally friendly technologies and innovations worldwide (Bhattacharjee et al., 2009). To achieve a truly sustainable, positive effect for manufacturing industry and the workforce it employs, the EU and its Members States should aim to avoid the relocation of manufacturing activities and related services (e.g. R&D, ICT) and support the permanent upgrading of European manufacturing industries.

One of the main aims of industrial policy regards the encouragement of innovation, knowledge and research. European Union industrial policy consists a framework which aims to encourage private investments in R&D, and insure an optimal use of the public resources for industrial research. Furthermore, encouraging investments in intangible assets and human capital is crucial, in order to maximize the efficiency of the current technology and its effects. Furthermore, supporting entrepreneurship and developing industrial sectors is an objective that goes beyond the limits of the industrial policy, by joining actions of the educational policies, internal market, financial services and tax policy (Bhattacharjee et al., 2009). Certain fields require specific intervention, in order to improve the internal market, such as the financial or services markets, where the technical barriers and the legislative differences limit the free trade, in order to improve the economic environment, with special attention in areas which present the fastest technological progress.

However, the development objectives set at European level cannot be reached without a tight interconnection of the industrial policy measures with those of some complementary policies, such as the commercial policy, the single market policy, transport and energy policies, research and development policies, competition policy, regional and macroeconomic policies. While in these fields the policies are already coordinated, the sustainable development requirements, with the three development pillars: economic, social and environmental, require supplementary measures for coordinating the industrial policy with the associated policies and requirements. Thus, European Union must insure the balance between the different policies, and this balance must be followed at national level, within the limits of competency of the different member states (Nica and Cuza, 2010). On the other hand, cohesion policies amount to an efficiency-based long-run strategy of 'catch-up growth', in which the interventions aim to accelerate catch-up growth and achieve cohesion policies, rendering industrial policy aims into increased growth and employment and the improved international competitiveness of European industrial sectors (Belyakova et al., 2017, Almeada et al., 2017)

Currently, competition, the efficiency of public and private services, and infrastructure are important determinants of industrial competitiveness in European member states. A stronger enforcement of competition rules is necessary to reduce competition distortions. Moreover, today, the competitiveness of European industry crucially depends on the quality and efficiency of the energy, transport and communication infrastructure services, with the upgrading and modernisation of these networks being rather essential. Transport networks need to be improved to overcome

any related obstacles and improve cross-border connections. These improvements will require massive investments and the development of innovative financing solutions. According to European Commission (2010), a new industrial innovation policy is needed to encourage the development of productive process of goods and services, as well as the enhancement of productive efficiency.

European industry must also strengthen the knowledge base to remain competitive, investing in research and innovation for a sustainable and inclusive economy. Most importantly, science, technology and innovation play a significant role in increasing technical efficiency and are a driving force in international competition. Innovation policy is a broad concept that contains research and technology policy and often overlaps with industrial policy.

A transition towards a sustainable, resource efficient economy is paramount for maintaining the long-term competitiveness of European industries. Overall, European member states have made significant progress in defining and implementing consistent national legislative frameworks for stimulating efficiency. However, some lack the experience and the administrative capacity to do this and for these countries the framework legislation at the EU level can provide guidance and support.

To ensure progress towards the Europe 2020 goals, a broad range of existing EU policies and instruments are used, including the single market, the EU budget and external policy tools. The ten priorities of the Commission guide the EU policies and help ensure progress towards smart, sustainable and inclusive growth. The strategy itself identified seven policy areas where jobs and growth were put forward through the following seven flagship initiatives: 'Innovation Union', 'Youth on the move', 'Digital agenda for Europe', 'Resource efficient Europe', 'An industrial policy for the globalisation era', 'Agenda for new skills and jobs' and 'European platform against poverty and social exclusion'.

2. Governance Applications

European Union 'Europe 2020' strategy gives recognition to the economic, social and environmental dimensions of sustainable development by drawing attention to education, research and development and innovation, low carbon emissions, climate resilience and environmental impact, and job creation and poverty reduction. In a broader policy perspective, the Europe 2020 strategy plays an important role in addressing the internationally adopted 2030 Agenda for Sustainable Development and thus putting the European Union on the right track to achieving a sustainable future.

The 2030 Agenda was formally adopted by world leaders at the United Nations Sustainable Development Summit in September 2015. The document, titled 'Transforming our world: the 2030 agenda for sustainable development', consists of a declaration, a set of 17 Sustainable Development Goals (SDGs; see Box 1 for a full list) and 169 related targets, a section on the means of implementation and on the follow-up and review of the 2030 Agenda. The EU was instrumental in shaping the global 2030 Agenda, which is fully consistent with Europe's vision and has now become the world's blueprint for global sustainable development.

In March 2017, at its 48th session, the United Nations Statistical Commission (UNSC) adopted a global indicator framework for monitoring progress towards the SDGs. The global list consists of 244 indicators to measure progress towards the 169 targets of the SDGs. In November 2016, the European Commission released the Communication 'Next steps for a sustainable European future: European action for sustainability', outlining its approach to achieving the 2030 Agenda. It presents the EU's answer to the 2030 Agenda and includes two work streams. The first work

stream is to fully integrate the SDGs in the European policy framework and current Commission priorities, assessing where we stand and identifying the most relevant sustainability concerns. A second track is related to reflection work on further developing the EU's longer term vision and the focus of sectoral policies after 2020, preparing for the long-term implementation of the **Sustainable** Development Goals:

- Goal 1. End poverty in all its forms everywhere
- Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3. Ensure healthy lives and promote well-being for all at all ages
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 5. Achieve gender equality and empower all women and girls
- Goal 6. Ensure availability and sustainable management of water and sanitation for all
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Goal 10. Reduce inequality within and among countries
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 12. Ensure sustainable consumption and production patterns
- Goal 13. Take urgent action to combat climate change and its impacts
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
- Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development

The quality and availability of infrastructure (energy, transport, and broadband) make an important contribution to an efficiency promoting environment. Industrial sectors need a modern public administration, able to deliver efficient and high quality public services (Korres and Kokkinou, 2011, Kokkinou, 2010). Coordinating clusters and networks improve industrial competitiveness and innovation by bringing together resources and expertise, and promoting cooperation among businesses, public authorities and universities. EU industrial and innovation policies should aim to overcome existing market failures and funding gaps, especially to supply the bridge between technical efficiency and productivity enhancement.

A review of national initiatives shows that there is a great variety of regulatory settings and organizational arrangements in place in relation to resource-efficiency policies. National policy priorities and responses are guided by EU regulations but

vary widely, driven by a combination of local economic and geographic conditions, environmental priorities, and economic concerns.

As far as the current situation is concerned, the World Bank scorecard uses six key dimensions to benchmark countries' supply chain performance (LPI index). The scorecard allows comparisons with the world (with the option to display world's best performer) and with the region or income group (with the option to display the region's or income group's best performer) on the six indicators and the overall LPI index (World Bank, 2020).

The supply chain performance (LPI index) is the weighted average of the country scores on the six key dimensions:

- Efficiency of the clearance process (i.e., speed, simplicity and predictability of formalities) by border control agencies, including customs;
- Quality of trade and transport related infrastructure (e.g., ports, railroads, roads, information technology);
- Ease of arranging competitively priced shipments;
- Competence and quality of logistics services (e.g., transport operators, customs brokers);
- Ability to track and trace consignments;
- Timeliness of shipments in reaching destination within the scheduled or expected delivery time.

The scorecards demonstrates comparative performance of all countries (world), regional and income groups.

Table 2: LPI Ranking

Country	Year	LPI Rank	LPI Score
Germany (Top Performer)	2018	1	4.20
Region: Europe & Central Asia	2018		3.24
Region: East Asia & Pacific	2018		3.15
Region: Middle East & North Africa	2018		2.78
Region: Latin America & Caribbean	2018		2.66
Region: South Asia	2018		2.51
Region: Sub-Saharan Africa	2018		2.45

Source: World Bank (2020)

An effective innovation and industrial policy governance is now recognized almost everywhere as one of the core enablers of growth and development, implementing that better policies leads to better growth and development performance. Such policies cover, for example, regulating services; providing infrastructure; implementing controls; and raising the quality of public–private partnerships (PPPs).The policy focus has evolved since 2007, tended to concentrate on facilitating trade and removing border bottlenecks. Policy makers and stakeholders deal with a wide range of policies. Growing concerns include spatial planning; skills and resources for training; the environmental, social, and economic sustainability of

the supply chain; and the resilience of the supply chain to any socio-economic disruptions (World Bank, 2020).

3. Conclusions and Policy Implications

European governments are in need of a more coherent, more coordinated approach towards industrial technical efficiency support. However, the pressure on public budgets adds to the urgency of this matter in different policy areas of industrial and innovation policy. The range of explicit innovation policies being applied is very much concerned with the supply side and even more with R&D support of various types, ranging from funding of science in public institutions through to fiscal incentives for firms to increase R&D spend. A comprehensive approach to industrial and innovation policy can be achieved by supporting markets for innovative goods and services and excellence in research in new technologies, including information and communication technologies (ICT), introducing a more focused strategy to facilitate the creation of areas for action, and in particular introducing a more focused strategy to facilitate the creation and marketing of new innovative products and services (European Commission, 2006). Within the domain of industrial and innovation policy, regulatory reform is seen to affect innovation indirectly through affecting the funds available for investment and market size and structure, and directly through its impact upon the promotion of technical efficiency and productivity.

An open, efficient and competitive business environment is a crucial catalyst for growth in a global context. Improving the business environment covers policies in areas ranging from improving infrastructure to shortening the time needed to obtain a building license. In many cases, better institutional mechanisms need to be functioning as a single research area, business environment and innovation system. There need to be strategic approaches, which not only promote closer interaction among sectors but also among policy-makers (from different policy fields and different levels of government). European innovation and industrial policy is therefore recommended to develop strategic approaches which integrate R&D, innovation and industrial policy along with a more coherent EU strategy for innovative competitiveness, giving special attention to ICT in innovation and industrial policy.

The main idea of strategic complements in the context of innovation and industrial policy is that the more one government does, the more the other wants to do, namely strategic complements of policy.

4. References

Battese, G. E., Rao, D. S. P. and Walujadi, D. (2001) Technical Efficiency and Productivity of Garment Firms in Different Regions in Indonesia: A Stochastic Frontier Analysis Using a Time-varying Inefficiency Model and a Metaproduction Function, *CEPA Working Papers*, No. 7/2001, Centre for Efficiency and Productivity Analysis, School of Economics, University of New England, Armidale.

Bhattacharjee A., de Castro E., Jensen-Butler C. (2009) Regional variation in productivity: a study of the Danish economy. *Journal of Productivity Analysis*, 31: 195–212.

Almeida Z., Scheuneman I., Sequeira T., Diniz F. (2017) Challenges Of A Sustained And Sustainable Development: A Study-Case, *Regional Science Inquiry*, Vol. IX, (2), 2017, pp. 243-250.

Belyakova G.,Y., Belyakov G.P., Sumina E.V., Badyukov A.A., (2017) Project-Based Approach To Formation Of Innovative Region Receptivity, *Regional Science Inquiry*, Vol. IX, (2), 2017, pp. 119-130.

Edler, J., Kuhlmann, S., & Behrens, M. (Eds.) (2003). Changing governance of research and technology policy: The European research area**.** Edward Elgar Publishing.European Commission (2010) *The Europe 2020 strategy*, European Commission, 2010.

Korres, G.M. and Aikaterini Kokkinou (2011) The Role of Innovation in Competitiveness and Convergence Process; A Benchmarking Study for European Regions, *Journal of Regional Science Inquiry.*

Kokkinou A. (2010) Estimating Technical Inefficiency: An Empirical Approach to EU Industries, *Regional Science Inquiry Journal*, Vol. II (2), pp. 95 - 104.Kuhlmann, S. and Edler, J. (2003) Scenarios of technology and innovation policies in Europe: Investigating future governance, *Technological forecasting and social change*, Vol. 70, Is. 7, 2003, pp. 619-637

Kuhlmann, S. (2001). Future Governance of Innovation Policy in Europe: Three Senarios. *Research policy*, *30*(6), 953-976.

Mytelka, L. K. and Smith, K. (2001) Policy learning and innovation theory: an interactive and co-evolving process *Research Policy 31* (2001) 1467–1479.

Oh, D., Heshmati, A. and Loof, H. (2009) Technical Change and Total Factor Productivity Growth for Swedish Manufacturing and Service Industries, *CESIS, Working Paper*, No. 193.

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