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Quality of Life: Challenges and Opportunities in the Crossroads of the Mediterranean

ASSOCIAZIONE ITALIANA PER GLI STUDI
SULLA QUALITÀ DELLA VITA

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Introduction

AIQUAV – Associazione Italiana per gli Studi sulla Qualità della Vita – is a point of reference for all those who in our country, but not only, conduct theoretical reflections and empirical research on the issue of quality of life; an increasingly crucial theme in a contemporary society strongly characterized by social imbalances, negative environmental effects, contradictions linked to economic development. On the 2023 Annual Conference, the accent will be placed on the Mediterranean, a crossroads and well-being for many populations. The conference will be held in a mixed-mode on-site/web. Both theoretical and applied contributions about well-being, opportunities but also responsibilities in the Mediterranean are solicited and welcome.

The Mediterranean has always been the theatre and crossroads of different peoples, cultures, traditions and religions. Some of the greatest civilizations of the past arose on the shores of the Mare Nostrum and have indelibly marked the course of history.

Few areas in the world match the historical density, heterogeneity and complexity of social interaction that, due to geographical proximity and mobility, have emerged in the Mediterranean world. The multiple realities that distinguish it offer a privileged point of observation for tackling the study of the problem of how communities belonging to different religions, languages, ethnic groups and traditions can interact with each other over time.

The contributions that will are collected represent an opportunity to explore some of the problems related to the interrelationship between the different peoples who inhabit the Mediterranean today, both from the point of well-being of the peoples, as well as from the demographic, statistical, socio-cultural, economic and legislative. Contributions from different disciplines were accepted and encouraged, from sociology to statistics, from law to economics, and so on.

Bari, 28/09/2023

Section I

Short papers

Climate change and the Italian Constitution: the origin of a revolution

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Abstract: The constitutional law no. 1/2022 is one of those destined to change the historical course of Italy, which recovers the sense of vast horizons. In the restless and mobile italian political chessboard, in fact, environmental protection has always been a minor pawn. However, the emerging historical conditions, dictated by a climate change of which every year our fragile terrestrial borders feel the incomparable power, have led the legislator to return to the issue the worthy importance, starting with its inclusion in the Constitutional Charter. In the scale of values and principles, consequently, in a few decades the environmental protection has gone from the last places to the first, and seems destined to remain there for a very long time, if not forever.

The analysis followed in this essay will develop along two main directives:

1) a brief examination of the legal concept of environment over time in doctrine and jurisprudence, trying to unravel the eternal skein that has been created by the contrast between the monist and pluralist conception;

2) the impact of climate change could play in providing the correct interpretation of the new articles 9 and 41. The essay, therefore, aims to highlight how the relationship between climate change and the Constitution should be conceived as a starting point of a legislative path that, as stated in the constitutional text, puts the protection of the environment, biodiversity and ecosystems in the foreground, also in the interest of future generations..

Keywords: environment; protection; climate change; constitution; law.

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1. Introduction: history and law

On 8 February 2022, the Italian Parliament approved Constitutional Law no. 1 with which Articles 9 and 41 of the Constitution were amended.

The third paragraph of art. 9 provides now for «the protection of the environment, biodiversity and ecosystems, also in the interest of future generations», while the second paragraph of Article 41 provides that «Private economic initiative [...] it cannot be carried out in conflict with social utility or in such a way as to damage security, freedom, human dignity, health or the environment».

These norms are revolutionary, because they are bound to mark a sudden change of pace in the legislative and institutional path of the country.

In the Italian political chessboard, in fact, the protection of the environment has always been a minor pawn, as can be seen from the old formulation of art. 9, which, in fact, did not even mention it.

The reasons of this absence are essentially due to two factors.

The first of these is attributable to the troubled process that led to the introduction of the article in question within the Constitutional Charter. Not a few, in fact, were the prejudicial hostilities to its existence on the part of some constituent legislators, among which the Christian Democrat party's deputy Umberto Tapini, then vice-president of the Constituent Assembly.

The hostilities were dictated by an ideological vision that attributed to the economy an hegemonic importance in the field of development of a historically agricultural and industrially underdeveloped Country compared to other European Countries, whose conditions were increasingly aggravated by the atrocities resulting from the Second World War.

In this way the adoption of policies functional to the promotion of the economy was justified through massive investments in industry and technology, conceived as an inseparable unit on the path of individual and collective economic progress; even at expense of the environment.

The concept that the State should intervene in this field, moreover, was also reflected by a fact, resulting from the observation that the scarce economic resources of the country were summarized by the extraordinary intellectual wealth that has distinguished Italy, in Europe and in the world, in the history of science and culture.

These considerations explain the original wording of art. 9, within which the Constituent Assembly has wisely combined future and past, on the one hand, promoting the development of culture and scientific and technical research, on the

other, protecting the landscape and the historical and artistic heritage of the nation.

What is missing in the previous constitutional design, therefore, is the word "environment", while the word "landscape" is present, which can be considered a sort of compromise clause deriving from the combination of the ideological prejudices just mentioned and the objective difficulty of identifying a notion of environment that can be translated on a legal level.

This is precisely the second reason for the absence of environmental protection in the original text of article 9, and it is firmly linked to the first.

If it is true, in fact, that the direct protection of the environment would certainly have caused a sacrifice of the economic interests of the country, then considered prevalent for the aforementioned reasons, it is equally true that in the fertile intellectual land from which the Italian Constitution matured, there was no real knowledge of the meaning of the environment on the legal level.

In this regard, it is enough to remember that the first inspiration of art. 9 of the Italian Constitution came from the Constitution of the Weimar Republic (1919), whose art. article 150 contained the prescription that «the monuments of art, history and nature [...] enjoy the protection and protection of the State», which, although foreign to the Italian legal tradition, followed almost verbatim the first text of art. 9, elaborated in the constituent assembly by the deputy Concetto Marchesi, distinguished latinist and former rector of the University of Padua: «The artistic, historical and natural monuments of the country constitute national heritage in any part of the territory of the Republic and are under the protection of the State».

The constitutional text, moreover, reflected the absence of an organic regulation of the environmental issue at the level of primary standardization. Under this point of view, it is necessary to mention the two main laws on the subject: the Croce law (law no. 778/1922) and the Bottai law (law no.1497/1939).

The Croce law represented the culmination of an important path of mobilization in defense of the landscape animated in Italy by intellectuals, jurists and scholars of various disciplines, sinking its roots, as well as in the legislation of the pre-unification states, in a cultural context that at the beginning of the twentieth century saw the spread of numerous movements for the conservation of the landscape throughout Europe.

Minister of Education during the fifth Giolitti government (1920-1921), Benedetto Croce became the bearer of these requests by presenting the bill in the Senate on September 25, 1920. Following the fall of the government, which took place the following year, after the necessary parliamentary process, the law was approved in 1922.

In his introductory report, the renowned minister set out some fundamental concepts which would form the basis of any subsequent political action to protect the environment and the historical and artistic heritage. In particular, it stressed the need for a rule that would put «a stop to the unjustified devastation that is being consumed against the most famous and most loved characteristics of our soil», in order to «improve and enhance, to the greatest extent possible, the greatest beauties of Italy, the natural and the artistic».

The protection of the landscape, for Croce, is also connected to the formation of national identity, since the landscape «is nothing more than the material and visible representation of the homeland, with its particular physical characteristics (...), with the multiple and varied aspects of its soil, as they were formed and have come to us through the slow succession of centuries».

On the same way the Bottai law (entitled "Protection of natural beauty") was. In fact, it introduced for the first time the Landscape Plan, as a tool for the regulation and use of areas of environmental interest, to be drawn up by the Ministry and to be deposited in the individual Municipalities.

The peculiarity of these provisions lies not only on the reference to the concept "landscape" instead of "environment", but on considering the same landscape together with the artistic beauties, on the basis of a classic “topos”, according to which "simulaverat artem ingenio natura suo" (nature strives to imitate art), which will be somehow transposed by art. 9 of the Constitution, in its original wording.

2. The precarious balance between the monistic and pluralistic conception of the environment

Over time, however, the uncontrolled proliferation of instances aimed at the expansion and construction of public and private works, has determined the emergence of an environmental culture that would have found increasing space since the seventies of the last century, and that would have aimed at the provision of a more precise regulatory and constitutional statute of environmental protection.

This circumstance, however, presupposed a precise definition of the concept of "environment" as an autonomous legal interest susceptible to protection, so that the efforts of doctrine and jurisprudence were directed to the construction of a synthetic and global notion of environment.

Two distinct orientations were opposed to resolve the definitional question: the "pluralist" and the "monist" conceptions.

The pluralist theory was firstly enunciated by Massimo Severo Giannini in an important study in 1973. In the opinion of the illustrious author, this concept included interests of various belonging and of different use, subject to distinct legal regimes, each governed by its own discipline.

In particular, according to this approach, the concept of environment, under a legal point of view, can be taken in a threefold sense:

a) landscaping, with reference to the legislation and the naturalistic dimension, in perfect adherence to the constitutional consideration in favor of the "landscape", expressed in the art. 9;

b) space, with reference to the legislation to protect environmental resources from degradation resulting from pollution and other inconveniences due in large part to human activities;

(c) town planning, with reference to land use planning and management.

From the description of this theory two basic facts emerge, which serve to outline its distinctive features.

In the first place, the supporters of this theory wanted to emphasize the multiplicity of the material elements constituting the environment and the differentiated protection recognized from time to time to them, with the consequence of radically denying the possibility of attributing to the environment an autonomous legal importance.

Secondly, it was considered appropriate to align the pluralistic legal concept of environment under the aegis of the constitutional principles expressly set out in articles 9 and 32 of the Constitution, on the subject of "landscape" and "health".

That approach was initially supported by constitutional case-law, in particular in judgment no 239/1982, in which the Court held that environmental protection «includes, as is commonly accepted, in addition to environmental protection linked to town and country planning, landscape protection, health protection and soil, air and water protection against pollution», in this way identifying in the environment a concept equivalent to the arithmetic sum of the specific aspects that the environmental interest from time to time can assume.

Around the second half of the 80s, however, the monist conception began to assert itself, under the decisive influence of the ideas offered by Community and international legislation and of the same constitutional jurisprudence.

In 1982, in fact, the World Charter of Nature was approved by the UN, while in 1987, at the European level, the title "Environment" was inserted into the Treaty of the European Community (TEC), and it has constituted the first legal basis for an environmental policy common to the various European countries.

In the same year there were pronounced two very important sentences of the Constitutional Court (nos. 210 and 641), where the existence of a unitary environmental legal interest is theorized.

Sentence no 210/1987, in particular, advocates a «unitary conception of the environmental interest including all natural and cultural resources», specifying that the environment «includes the conservation, rational management and improvement of natural conditions (air, water, soil and territory in all its components), the existence and preservation of terrestrial and marine genetic heritage, of all the animal and plant species that live in it in its natural state and ultimately the human person in all his expressions».

Taking up these considerations, sentence no. 641/1987 defines the environment interest as a unitary thing consisting of «various components, each of which may also constitute, separately and separately, the object of care and protection; but all, as a whole [...] attributable to unity».

These two judgments therefore represent the jurisprudential prop on which the monist theory is based, which from that moment will also be endorsed by the judges of the Supreme Court of Cassation. The reference is to sentence no. 2515/2002, in which the environment is again defined as an «intangible and unitary public interest».

Alongside this foundation, the supporters of the monist theory argue the validity of their thesis also using some normative data: in particular, the creation of a special ministry with Law no. 349/1986 and the attribution - which took place with the constitutional reform of 2001 - to the State of exclusive competence in the field of environmental protection (art. 117, co. 2, lett. s) Cost.), in addition to the introduction of Legislative Decree 6 April 2006, n. 152 (so-called Environmental Code), reveal the intent of the legislator to elevate the environment to an interest with its own identity and, as such, susceptible to autonomous protection.

Even in the face of these arguments, however, part of the doctrine has noted that the overcoming of the pluralist conception, in fact, has never happened. An important example of this is the sentence 25/01/1989 no. 440 of the Court of Cassation which, if on the one hand tries to provide a unitary definition of the environment, on the other feels the need to list, in clear connection with the pluralist theory, the components of the same.

3. The new Article 9 of the Constitution

Forecasting future longevity is not an easy task since the accuracy depends on This analysis, therefore, highlights how the dichotomy between pluralism and monism, for a long time, has been at the center of the debate concerning environmental protection, without reaching a satisfactory conclusion. The pluralist conception, in fact, fails to grasp the traits of indivisibility that characterize the environment, while the monist one does not grasp the numerous relationships that nevertheless exist between the various environmental components and between them and man.

This has important consequences on the legal level, because if, as we have seen, the environment is composed of several fragments, it certainly cannot be spoken of an autonomous right to the environment, that is, understood as an autonomous legal position, but rather of a plurality of rights corresponding to the various interests of which it is composed. Conversely, if the concept of "environment" is denied its pluralistic character, the risk is that of leaving without protection legal interests attributable to it, and which would be worthy of it.

The reform of Articles. 9 and 41 of the Constitution, operated by Law no. 1/2022, sanctioned the definitive overcoming of the pluralist theory and, conversely, the consecration of the monist one.

By freeing environmental protection from landscape protection, in fact, the legislator of the reform has explicitly recognized the environment as an autonomous legal position.

In particular, the constitutional reform marks the transition from an "anthropocentric" to an "ecocentric" vision of the environment, according to which the right of man to enjoy the best possible environment (the right to the environment), what the pluralistic conception presupposed, is replaced by the configuration of the environment as an autonomous entity to be preserved as an interest in itself (the "right" of the environment).

This is an immediate and fundamental consequence of the constitutionalization of the environmental interest, of which it is also appropriate to appreciate the inclusion of new concepts, which corroborate the prevalence of the monist conception of the environment, at the same time "called" to pluralism.

The reference is to "biodiversity" and "ecosystems", which contribute to accentuating the innovativeness of the amendment in question, in the sense of recognizing not only an autonomous protection of the environment, but also of the other elements closely related to it (and referred to therein).

According to the biological sciences, in fact, it is clear that "ecosystem" means the

set of living organisms (biotic factors) and non-living matter (abiotic factors) that interact in a given environment constituting a self-sufficient system in dynamic equilibrium, while "biodiversity" means the coexistence in the same ecosystem of different animal and plant species.
The relationship between these concepts and the environment also finds a correspondence in the same syntactic placement of the terms within the new third paragraph of Article 9, where we speak, first of all of the environment, then of the biodiversity and ecosystems.
In this way, the legislator embraces all the categories of the "cosmos", in anticipation of their harmonization.

4. Climate change in the dynamics of constitutional reform

Among the many causes that may have led the legislator to veer towards such an important choice, undoubtedly the most important is that concerning climate change.

Although the constitutional provisions lack a reference to the climate, it is nevertheless true that the amendment of Article 9 intervenes at a time when the problem of climate change is at the center of the policies of countries around the world.

In 2015, in fact, world leaders agreed in Paris on new ambitious goals in the fight against climate change, reiterated by the countries of the European Union in 2019 within the European Green Deal. The most important is undoubtedly to achieve a climate-neutral EU by 2050 while promoting the wellbeing of its citizens. Which means, first of all, reducing greenhouse gas emissions as much as possible, but it also means compensating for any remaining emissions.

In this regard, the American theoretical physicist Lawrence M. Krauss explains well the principles underlying climate change caused mainly by fossil fuels. These can be summarized in three points:

1) The Earth is enveloped by an atmosphere that retains a lot of thermal energy, maintaining the average effective temperature of about 15 degrees: if there were no atmosphere, the average surface temperature of the Earth would be about 18 degrees below zero;

2) to keep the average temperature constant, it is necessary that the input energy is equal to the output energy: the input energy is that which derives from the sun, of which about 30% that hits the Earth is immediately reflected in space from the upper part of the atmosphere, while the rest, which is absorbed, determines how

much the planet heats up;

3) When the percentage of carbon dioxide increases, the atmosphere becomes less resistant to solar energy, unbalancing the balance between incoming and outgoing energy in favor of the former: this causes the increase in earth's temperature and the related climate change.

To these principles must be added a fact obtainable from atmospheric chemistry, namely that the increase in the concentration of carbon dioxide, due to fossil fuels, will not reverse for at least another thousand years, continuing at a growth rate of about 0.2 degrees every decade.

This forecast casts a dark shadow over the future, of which it is possible to feel the first glimpses by observing the effects that climate change is already producing in the present. Floods, drought, scorching heat affect our territory more and more frequently, damaging the environment and consequently the ecosystems with incomparable power. It is therefore necessary, if not to reverse this process which, as mentioned, is irreversible, to correct its trend by moving it in a direction that allows us to preserve the fragile harmony existing between men and the environment in which they live.

In this regard, a preponderant function must be played by the juridical system, in the awareness that it does not have the function of correcting men or their inclinations, but of directing their behavior, that is, the actions that cause effects in the world.

5. Conclusion remarks

The inclusion of the environment, biodiversity and ecosystems in art. 9 of the Constitution moves in this perspective, as well as art. 41 Cost., second paragraph, which now provides that the economic initiative may not be carried out "in contrast [...] to the environment".

It follows that the absence of a reference to climate change does not affect that the aforementioned provisions must be interpreted as establishing a climate obligation on the part of the State and private individuals. In this sense, the mention of the "environment", "biodiversity" and "ecosystems" is beneficial, but a decisive role is also assumed by the reference to "the interests of future generations" (art. 9).

This clause, in fact, if read in conjunction with art. 2 and 3 of the Constitution, can serve to found a principle of intergenerational solidarity, in the name of which the State and private individuals could be required to guarantee the necessary con-

ditions for the full development of the human person, not only in the present but also in an intertemporal dimension.

As a matter of fact, it is a principle whose foundation can be found over time, even already within two classics of philosophical and economic thought, Adam Smith and Karl Marx. If in his Lectures, Adam Smith affirmed that "no maxim is more generally shared than that according to which land is the property of all generations; and it would be assumed that a previous generation can limit the use that subsequent generations will make of it", Karl Marx, in Capital, formulates a thought not very different from his historical "antagonist", where he states that «the Earth belongs to the generations to come, and what we do there now must be measured over the whole unfolding of time».

More recently, the philosopher Hans Jonas reiterated that «humanity does not consist not of peers, but at every moment of belonging to all ages of life [...]. This means that we already exist every time with a part of the future, and a part of the future exists with us».

Remembering these illustrious precedents means drawing from the history of thought the energies and ideas to build a future no longer measured only on man but, as explicitly stated in the constitutional text, on the environment, biodiversity and ecosystems, also in the interest of future generation.

It can be concluded then that the constitutional reform represents a step forward in the duty of the Italian State in the fight against climate change. A duty that arises, therefore, from the threat of what constitutes the object of protection, and that for this reason pushes towards an ethics of conservation, preservation and prevention.

Climate change, therefore, requires an interpretation of constitutional provisions that is left not only to the legislator, but also to the citizens.

In the first case, because they are principles that need to be concretized through ordinary laws; in the second, so that citizens may be called to adopt behaviors that are the fruit of a conscious adherence and awareness of the grave threat that looms dramatically over the present and future.

References

Discussion of the principles of social (cultural) relations by the Subcommittee on the Constitution (October 18, 1946) Retrieved from: www.nascitacostituzione.it

Publio Ovidio Nasone, Le Metamorfosi, III, 158-9

The association of the Italian Environmental Fund (FAI) was established on 28 April 1975.

M.S. Giannini (1973). Ambiente: saggio sui diversi suoi aspetti giuridici. Rivista Trimestrale di Diritto Pubblico.

E. Capaccioli e F. Dal Piaz (1980), Ambiente (tutela dell'). Parte generale e diritto amministrativo, in Novissimo Digesto Italiano, Torino, I, 257 ss.

Corte costituzionale, sentence 29/12/1982, n. 239. Retrivied from www.cortecostituzionale.it

Corte costituzionale, sentence 28/05/1987, n. 210. Retrivied from www.cortecostituzionale.it

Corte costituzionale, sentence 30/12/1987, n. 641. Retrivied from www.cortecostituzionale.it

Corte di Cassazione, sentence 21/02/2002, n. 2515, in Giustizia civile, 2002, 567.

A. Crosetti, R. Ferrara, F. Fracchia, N. Olivetti Rason, Diritto dell'ambiente, Bari, 2008.

F. Fracchia, Hearing at the 1st Permanent Committee of the Senate of the Republic "Constitutional Affairs, Affairs of the Presidency of the Council and the Interior, General Organization of the State and Public Administration". D.D.L. cost. 83 and conn. (Constitutional protection of the environment), 23 settembre 2020. D.D.L. cost. 83 e conn. Retrivied from www.senato.it

Lawrence M. Krauss, The physics of climate change, Head of Zeus, 2021.

Commissione europea, Le cause dei cambiamenti climatici, retrivied from www.europa.eu.

Adam Smith. Lectures on]urisprudence, R.L. Meek, D.D. Raphael e P.G. Stein (ed.), Oxford, 1978.

Karl Marx, Il Capitale. Aurelio Macchioro e Bruno Maffi (a cura di), Utet, Torino, 2013.

H. Jonas, Sull'orlo dell'abisso. Conversazioni sul rapporto tra uomo e natura, Torino, 2000.

R. Bifulco, First reflections around the l. cost. 1/2022 on environmental protection, paper - 6 April 2022, 3. Retrivied from www.federalismi.it.

Inequalities in health among migrants. A bibliometric approach for knowledge-based policy recommendations

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Abstract: There are several socioeconomic and demographic factors (gender, education, employment, income, ethnicity) that influence not only how healthy a person is but also whether and how a person access and utilize health care services. In this case, inequalities in access to health care are identified when systematic differences among different population groups arise. Regarding ethnicity, even if migrants tend to be healthier than natives, literature has shown that there are important differences when analyzing access to health care services between native and migrant populations. Within this context, the main purpose of this research is to explore the scientific production on health access inequalities applying bibliometric techniques to analyze scientific productivity, extract its central themes and explore changes over time. This exploratory approach allows to identify the key subjects discussed across academic communities and to present findings as potential policy recommendations, which remains particularly important given that inequalities in healthcare access have significant social and economic costs both to individuals and societies.

Keywords: Inequalities, migrants, health, bibliometric.

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1. Introduction and objectives

Since the early ninety-sixties, scholars have found a downward slope regarding health differences (in terms of one of both outcomes and/or access) across groups of population not only across every country around the globe but also within countries (inside national boundaries). This slope materializes itself into the socioeconomic gradient of health outcomes or health care access among individuals having diverse characteristics, which have been defined as health inequalities.

Health inequalities are the result of a highly complex mix of conditions and experiences and/or access to resources, which might exist alone or combine to cumulate. On one hand, conditions and experiences characterize individuals which are born, live, work, and grow older in a certain context; here individuals might differ on their health outcomes and access in terms of their gender, education, income, personal networks, migratory status, and social relations, among others. On the other, each individual get access to resources and decision-making processes (to its own degree); such as the access to: social protection measures (affordable child services or housing, sickness and unemployment protection, pensions, etc.), healthy housing and settlement, quality health services and prevention measures, or access to other financial and non-financial services.

Alone or together, conditions-experiences of individuals and their degree of access to resources/decision-making processes are negatively impacted by discrimination, which often affects women, older people, people with disability, or could be based on ethnicity (migratory status) or sexual identity. Discrimination is often exerted by individuals but could also be exerted by institutions. In this case, when social institutions discriminate, entire groups of population might be at risk of receiving inferior services or having different access to health services which, in contrast, could influence their chances to enjoy healthier lives.

Health is a fundamental human right. Thus, identifying differences in health outcomes and access to health services and its main drivers is extremely important for reducing health inequalities and progress towards health equity, allowing everyone to attain their full potential for health and well-being (WHO Thirteenth General Programme of Work). Both academic and institutional research on health inequality has a long-standing tradition and remains the main source of knowledge for policy making in developed countries and in multicultural and aged modern societies. Previous studies have shown that one of the central themes capturing the attention from research on health inequalities/disparities in recent decades were those focused on differences between natives and migrants and/or among migrants (Benach

de Rovira, 1995; Almeida-Filho et al., 2003). According to United Nations data, today there are nearly 1 billion migrants globally (including international migrants and forcibly displaced), which represent about 1 in 8 of the global population. Thus, in the first place, the increasing importance of international migration as a growing phenomenon is changing the structural composition of societies; in the second, the experience of migration becomes a key determinant of health and well-being. In fact, migrants remain among the most vulnerable population subgroups of modern societies because they often face discrimination, and poor living, housing, and working conditions along their biographies; and inadequate access to health care services, despite being frequently affected by physical and mental health problems (once the healthy migrant effect vanishes) (IOM 2009, Rechel et al. 2013, WHO 2022).

If compared to bibliometric studies based on health inequalities, analyses regarding the scientific production on migrants' health are still scarce. However, there are few recent studies on this subject that are relevant to our analyses and deserve to be highlighted. For example, Sweileh et al. (2018) examined the growth of publications, the geographical distribution of authorship, international research collaborations and highly cited articles in the health of international migrants.

have been focused on a specific region or country or groups of countries (Benach de Rovira, 1995; Almeida-Filho et al., 2003; Ritz et al., 2010), on health systems (Yao et al., 2014) or health reforms (Macías-Chapula, 2002). Other recent studies important to our analysis have considered citation practices, and the most productive authors and journals in health inequalities (Bouchard et al., 2015); North-South gaps and international collaborations (Cash-Gibson et al., 2018); and the citation-space and the roles of several factors on its structure (Collyer and Smith, 2020).

Considering the increasing relevance of migrants' health among the main emerging themes in research on inequalities (Sweileh et al., 2018), this paper is aimed at providing a comprehensive snapshot of national and international contributions to literature in migrants' health inequalities, information needed to identify gaps that future research could fulfil. In order to achieve this goal, firstly, we describe the evolution that the amount of the academic production on health inequalities/disparities/equity in migrant groups have had over an extended period of time (1991-2022) and, secondly, we identify which the main topics under study and map the specific roles that main topics have had within the academic production. Other authors have recently focused on Nordic countries (Laue et al., 2023; Kumar et al., 2022), analysing whether and how health inequalities in general, and inequalities due to migrant status, in particular, have been monitored. From a different perspec-

tive, some scholars inquired on the increasing inequalities on migrant health caused by the COVID pandemic (i.e.: Alarcão et al., 2022).

2. Data collection and methodology

In this paper we employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) model proposed by Moher et al. (2009) to retrieve scientific publications (Figure 1). PRISMA offers a comprehensive framework that outlines the criteria for selecting articles in a systematic literature review, ensuring transparent and reproducible selection processes. To retrieve the articles, we accessed the Web of Science (WoS) indexing database, specifically the Science Citation Index Expanded (SCI expanded) and the Social Science Citation Index (SSCI) Web of Science Core Collections maintained by Clarivate Analytics. We constructed a query using the commonly used English terms "Health" and "Inequality" to describe the topic. Following the initial phase of PRISMA, the query used for document search in the WoS database was as follows: health AND migrants AND inequalit* OR health AND ethnic AND inequalit* OR health AND race AND inequalit* OR health AND migrants AND inequit* OR healt AND ethnic AND inequit* OR health AND race AND inequit* OR health AND migrants AND disparit* OR health AND ethnic AND disparit* OR health AND race AND disparit*. Quotation marks were used to retrieve records with exact term sequences, while asterisks served as wildcards to capture term variations. Data collection occurred in early July 2023. We refined the search by selecting only articles, proceedings papers, review articles, and book chapters published in English between 1991 and 2022, based on the relevance of their content. We collected bibliographic data, including titles, abstracts, author names, keywords, and cited references. The documents were exported to PlainText format and screened by two selectors (AS and LD) to include only relevant and coherent documents. After excluding records without abstracts and those focusing on detailed medical procedures or practices, a total of 6,799 (you can see all detailed procedure in PRISMA chart, figure 1) documents were retrieved. For conducting bibliometric analyses on the entire collection, we employed the bibliometrix R open-source package (Aria and Cuccurullo, 2017), which facilitates quantitative research in scientometrics and bibliometrics. This study utilized bibliometric analysis to examine the conceptual structure of publications within a specific scientific field, enabling the generation of clusters that provide a comprehensive overview of diverse research in the field (Börner et al.,

2003). To explore the conceptual structure, we utilized two complementary analyses: co-occurrence network analysis and thematic mapping. These approaches facilitated the identification of relationships among terms, key research themes, and their development. The degree of similarity between publications was determined by the extent of shared keywords, indicating their association within the same research field. Co-occurrence network analysis (Wang et al., 2019) specifically captured themes represented by sets of terms extracted from documents, such as author and journal keywords. This technique quantified the frequency of term co-occurrence in the document collection and normalized the results using the association index proposed by Van Eck and Waltman (2009). The resulting co-occurrence matrix was represented as an undirected weighted network. Community detection, performed using the Walktrap algorithm (Pons & Latapy, 2006), identified strongly linked groups of terms sharing common characteristics or playing similar roles within the network (Aria et al., 2022). We employed thematic mapping, a two-dimensional representation of network findings proposed by Cobo et al. (2011), to visualize the identified themes. The x-axis represented Callon centrality, indicating the level of significance that a theme holds within the research field, while the y-axis represented Callon density, reflecting the degree of theme development (Callon et al., 1983). This combination of measures facilitated the identification of four types of topics based on their location on the map. The first quadrant of the map represented highly significant and well-developed motor themes. The second quadrant encompassed isolated or niche themes with limited external links, resulting in low centrality and limited importance for the broader research field. The third quadrant captured emerging or declining themes, indicating weak or marginal development. The fourth quadrant identified basic and transversal themes that cut across different research areas. Each theme was represented as a network cluster on the map, with the bubble name indicating the word with the highest occurrence within the cluster, and the bubble size representing the proportion of word occurrences within the cluster. By employing these methodologies, our study effectively mapped the conceptual structure of the collected scientific documents, thereby revealing significant research topics and trends in the field of population aging.

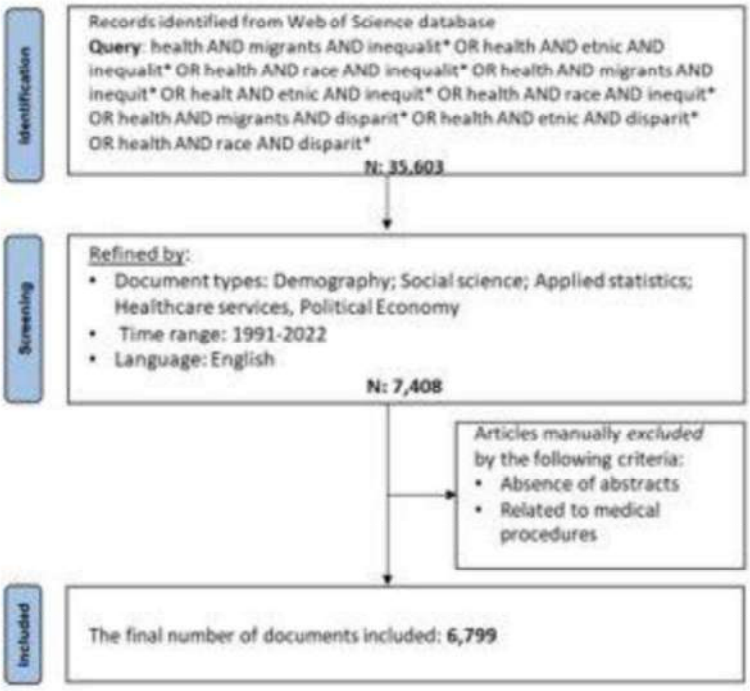

Figure 1. Data retrieval. PRISMA chart for migrants' health query.
Source: Own elaborations based on data retrieval.

3. Preliminary results

The initial information extracted from the utilized library allowed us to outline a descriptive overview of the analyzed corpus. There are 1,532 sources, a relatively high number considering the applied filters, this can suggest that there are a high number of journals interested in the theme. The average number of citations per document amount to approximately 37.44, high activity in the community about this field. The total number of authors is 19,189, with 762 documents having single authors. Figure 2 displays the growth of scientific production over the examined time interval for this analysis, with an overall annual growth rate of 20.17 %. The graph shows that the growth in scientific production has been very high in recent years. In fact, it can be seen that until 2012 the number of published papers was 1,780, and since 2013, in the last 10 years, have been published 4,751 papers. These results show high activity, with high collaborations and citations but a rather low number of actual publications.

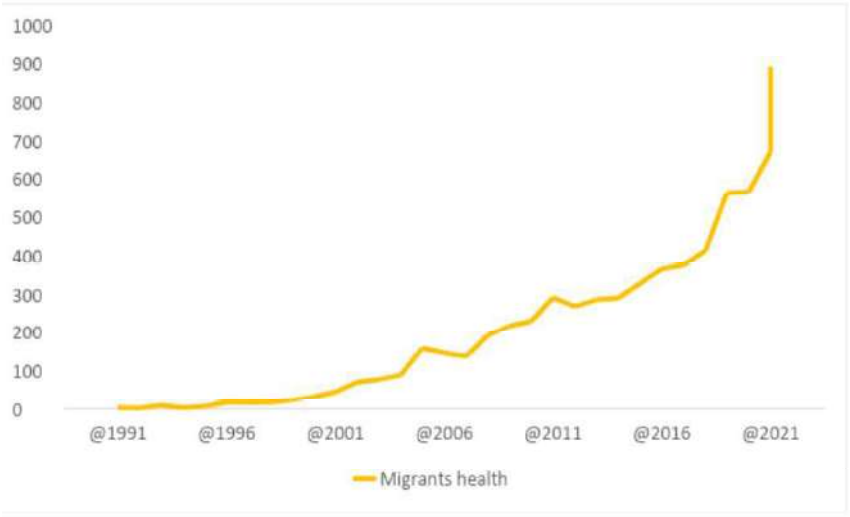

Figure 2. Temporal evolution of the scientific production about migrants' health.
Source: Own elaborations based on data retrieval.

The map in Figure 3 shows the five themes extracted from the papers by the model, the diameter of areas of each cluster represents the cluster frequency. The cluster with the higher frequency is labelled with keywords "racial disparities, population, women, ethnicity, racism", this represents basic themes with a transversal dictionary, low density but high centrality. The next three clusters have appreciably the same diameter. The first is "ethnic disparities, perception, cultural competence. physician, communication", this cluster represents a niche discourse, with low centrality but high density. Another is "african-american, residential segregation, us, infant-mortality, age", this cluster is a motor theme, with high density and centrality. While the cluster labelled with "stress, perceived discrimination, depressive symptoms, psychological distress" is difficult to classify. Because it is between the four quadrants we can not classify the theme inside a specific role. In conclusion, the theme with keywords "migrant, paradox, countries, rated health, europe" is emerging or declining. We can not be sure which of the two types because we need a longitudinal analysis to understand if the themes decline or emerge.

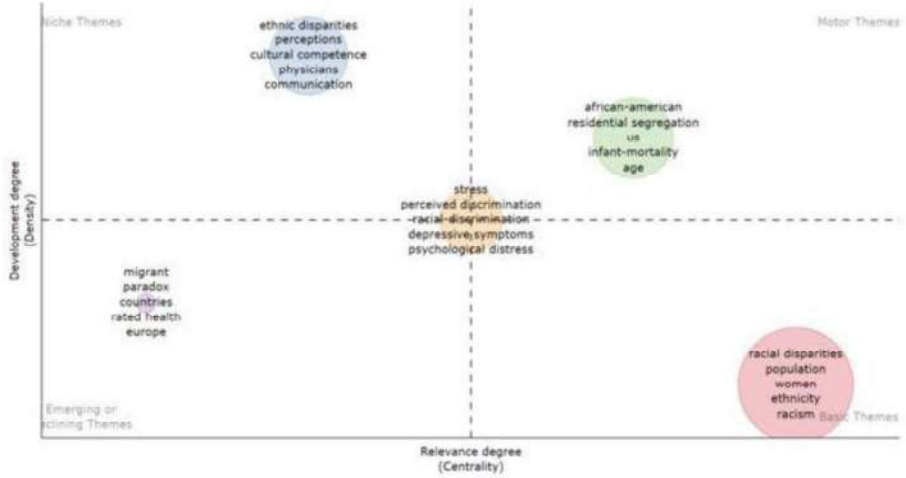

Figure 3. Thematic maps of the scientific production on migrants' health.
Source: Own elaborations based on data retrieval.

4. Concluding remarks and some recommendations

Undoubtedly, research on how to improve the health of migrants is relevant to inform not only policy makers and stakeholders but also the healthcare personnel. Our bibliometric analysis has shown that the attention given to migrants' health has significantly increased recently, as reflected by the growing number of publications. Through the mapping of research on migrants' health inequalities we identified some gaps (in terms of health differences among different migrant groups and the link to the context of the health system) and can suggest lines for future research that need to be further addressed. As most previous bibliographic research has focused on a specific territory, our contribution is to provide an overview of the main characteristics of the entire research activity on the different health challenges faced by migrants worldwide. However, enhancing the bridge between the results obtained by these studies and policy making and implementation remains the central issue that must be faced. One of these enhancing measures could be to look for more accurate and innovative forms of knowledge integration on health inequalities between natives and migrants or among migrant groups between researchers, policy makers, stakeholders and health personnel to measure the impact of actions and strategies that have been developed. Future research following a bibliometric perspective, must deal with the identification of policy guidelines and interventions

proposed and studied by the scientific production on migrants' health inequalities or disparities and their evolution over time and across and within countries and migrants' subgroups.

Finally, one of the most important findings arising from this study regards data availability. In fact, in order to further support the development of the academic production on migrants' health, data about their health status and health care access must be unlocked, guarantying availability.

References

Alarcão V, Virgolino A, Stefanovska-Petkovska M, Neves J. Exploring the Effects of the COVID-19 Pandemic on Mental Health and Well-Being of Migrant Populations in Europe: An Equity-Focused Scoping Review. Behav Sci (Basel). 2022 Oct 14;12(10):393. doi: 10.3390/bs12100393. PMID: 36285962; PMCID: PMC9598275.

Almeida-Filho, N., Kawachi, I., Filho, A. P., & Dachs, J. N. W. (2003). Research on health inequalities in Latin America and the Caribbean: bibliometric analysis (1971–2000) and descriptive content analysis (1971–1995). American Journal of Public Health, 93(12), 2037-2043.

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. Journal of informetrics, 11(4), 959-975.

Aria, Massimo, Cuccurullo Corrado, D'Aniello Luca, Misuraca Michelangelo, and Spano Maria. 2022. Thematic analysis as a new culturomic tool: The social media coverage on COVID-19 pandemic in Italy. Sustainability 14(6) 3643.

Börner, K., Chen, C., & Boyack, K. W. (2003). Visualizing knowledge domains. Annual review of information science and technology, 37(1), 179-255.

Callon, Michel, Courtial Jean Pierre, Turner William A., and Bauin Serge 1983. From translations to problematic networks: An introduction to co-word analysis. Social Science Information 22 (2), pp. 191-235

Cobo, Manuel J., López-Herrera A. G., Herrera-Viedma Enrique, and Herrera Francisco 2011. Science mapping software tools: Review, analysis, and cooperative study among tools. Journal of the American Society for information Science and Technology 62(7), 1382-1402.

De Rovira, Joan Benach. 1995. "Análisis bibliométrico de las desigualdades en n salud en españa (1980-1994)." Gaceta Sanitaria 9.49: 251-264.

Kumar BN, Diaz E, Castaneda AE, Ahrne M, NØrredam ML, Puthoopparambil SJ.

Migration health research in the Nordic countries: Priorities and implications for public health. Scandinavian Journal of Public Health. 2022;50(7):1039-1046. doi:10.1177/14034948221125037

Laue J, Diaz E, Eriksen L, Risør T. Migration health research in Norway: a scoping review. Scand J Public Health. 2023 May;51(3):381-390. doi: 10.1177/14034948211032494. Epub 2021 Oct 5. PMID: 34609260; PMCID: PMC10251465.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & TP Group. (2009). Linee guida per il reporting di revisioni sistematiche e meta-analisi: il PRISMA Statement. PLoS Med, 6(7), e1000097.

Pons, Pascal, and Latapy Matthier. 2006. Computing communities in large networks using random walks. J. Graph Algorithms Appl., 10(2), 191-218.

Sweileh, W.M., Wickramage, K., Pottie, K. et al. Bibliometric analysis of global migration health research in peer-reviewed literature (2000–2016). BMC Public Health 18, 777 (2018). https://doi.org/10.1186/s12889-018-5689-x

Van Eck, Nees, and Waltman Ludo. 2009. How to normalise co-occurrence data? An analysis of some well-known similarity measures. Journal of the American society for information science and technology 60, 1635–1651

Wang, Haifeng, Zhao Yapu, Dang Beilei, Han Pengfei, and Shi Xin. 2019. Network centrality and innovation performance: the role of formal and informal institutions in emerging economies, Journal of Business & Industrial Marketing 34(6), pp. 1388-1400Winston, A

Spatial Statistical Model for the Analysis of Poverty in Urban Areas

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Abstract: The paper analyses the concept of poverty through a multidimensional approach that uses multiple indicators to define a condition of poverty and allows to denote territorial areas and/or population subgroups characterized by situations of inequalities. The complexity of the poverty phenomenon thus poses the need to identify analytical techniques that allow poverty to be framed in a broader context, to improve knowledge of the problem and deal with it through specific economic and social interventions. The data analysed in this paper allowed the construction of three sets of indicators referring to three areas of poverty: economic, social, and housing. Two methodologies were adopted to study the data. The first based on the Fuzzy approach that uses the technique of Fuzzy Sets to synthesize and measure the incidence of relative poverty in the considered population starting from the statistical information provided by a plurality of indicators. The second, based on a the DBSCAN method for identifying dense areas.

Keywords: statistical methods; poverty, fuzzy, DBSCAN.

1. Introduction

The profound economic and social transformations that have taken place in recent years pose the problem of defining poverty which can be analyzed from an economic point of view, as an insufficiency of monetary resources, or from a social

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point of view, as an insufficiency of factors necessary to guarantee a good level of well-being compared to that owned by other families. In recent years, attempts have been made to study the problems of income distribution and poverty at the local level, however having to deal with severe limitations in the availability of data. In the case under study, the data of an Italian region, Puglia, were analysed, focusing on the data of "To measure of municipality", a multi-source statistical information system in which the sources of an experimental nature are placed side by side with the more consolidated ones and is the result of the project "Measures of well-being and planning at the municipal level" launched in 2016. The data available allow us to understand the social, economic, demographic, and environmental conditions of the regional territory, together with the measures that reflect the levels achieved in terms of community welfare.

The presence of a vast range of definitions of poverty requires the need to resort to a set of indicators useful for defining the living conditions of the various subjects [Analisi della povertà relativa Siqual, Istat 1997; La misura della povertà assoluta. Istat 2009]. Consequently, scientific research options have shifted towards the definition of a multidimensional approach, moving towards fuzzy classifications, in which each unit belongs and does not belong to the category of the poor at the same time.

The approaches used to synthesize and measure the incidence of relative poverty within the population considered are the Totally Fuzzy and Relative method and the DBSCAN method. The first method uses the Fuzzy Sets technique (Fuzzy Set) to obtain a measure of the incidence of relative poverty within a population from the statistical information provided by a plurality of indicators; the second is a method of grouping territorial units to obtain areas of high (or low) intensity of the phenomenon which allow the aggregation of homogeneous contiguous spatial units with respect to the phenomenon under study.

2. Poverty indicators

2.1 Data sets and indicators

Several poverty measures were constructed through the analysis of 9 indicators divided into 3 sets for each of the poverty areas identified: economic, social, and housing. The indices were chosen to identify levels of economic, social, and housing hardship and were calculated so that high index values corresponded to high

poverty levels:

Set 1 - Indicators related to Economic Poverty
- Gross disposable income per capita
- Single-income registered households with children under 6 years old
- Registered households with equivalent income below the social allowance amount

Set 2 - Indicators related to Social Poverty
- Low work intensity of registered households
- Low work intensity
- High school graduates 25-64 years of age enrolled in the registry

Set 3 - Indicators related to Housing Poverty
- Housing units reached by Ultra broadband 30 Mb
- Index of availability of services in the dwelling

The data available for each municipality were merged at the provincial level to analyse them in each of the three identified sets.

3. Approaches and methodologies for poverty analysis

3.1 The Fuzzy approach

The development of fuzzy theory initially stems from the work of Zadeh [Zadeh, L.A:, 1965] and subsequently was conducted by Dubois and Prade [Dubois, D., Prade, H., 1980]. The fuzzy theory develops starting from the assumption that each unit is not univocally associated with only one but simultaneously with all the categories identified based on links of different intensity (degrees of association).

The first measurement based on the fuzzy set theory, named TF (Totally Fuzzy), was suggested by Cerioli and Zani [Cerioli, A., Zani, S., 1990]. This logic can be applied to both continuous and ordinal variable cases. However, in the latter case, the maximum and minimum values can be determined by assuming the value of the lowest category as minimum and the highest as maximum.

Cheli and Lemmi [Cheli, B., Lemmi, A. A, 1995] have proposed a generalization of this approach, called Totally Fuzzy and Relative (TFR). This method is also called "totally relative" because the value of the membership function is entirely determined by the relative position of the individual in the distribution of the population. The fuzzy TFR approach consists in defining the measurement of an individual's degree of belonging to the totality fuzzy, included in the interval between 0 (with an individual who does not demonstrate a clear belonging) and 1 (with an individual who demonstrates a clear belonging).

If we suppose to observe k indicators for each family, the function of belonging of the i-sima family to the blurred subset, can be defined as follows [Cheli, B., Lemmi, A. A, 1995]:

$$f(x_i) = \frac{\sum_{j=1}^{k} g(x_{ij}).w_j}{\sum_{j=1}^{k} w_j} \qquad i = 1,\ldots,n$$

where $w_1,\ldots,w_k$ represent a generic system of weights.

The Totally Fuzzy and Relative method was applied on the data of all the Italian regions obtaining a value of the individual wi weights, which varies according to the level of importance in determining the degree of quality of the situation.

The indicators were chosen to identify the different levels, related to the aspects of poverty [Montrone, S., Perchinunno, P., Rotondo, F., Torre, C. M., Di Giuro, A, 2009; Perchinunno, P., Rotondo, F., Torre, C. M., 2008], and grouped in the three described sets characterized by different situations in the different components considered: economic, social, and housing poverty. The Total Fuzzy and Relative method was applied on the data of all the Apulian municipalities obtaining a value of the individual wi weights, which varies according to the level of importance in determining the degree of quality of the situation.

Minimum, maximum, and average values were calculated for each indicator of the different sets. For each set of indicators, the fuzzy value and its related values were calculated. As a result of the application, we classified the Apulian municipalities based on the fuzzy values obtaining the classification shown in Table 1. High values are significant of municipal situations of poverty, vice versa low values are significant of situations of no hardship.

Fuzzy values	Number of municipalities			%		
	SET 1 Economic hardship	SET 2 Social hardship	SET 3 Housing hardship	SET 1 Economic hardship	SET 2 Social hardship	SET 3 Housing hardship
0,0 ┤ 0,2	0	14	127	0	5	49
0,2 ┤ 0,4	29	48	72	11	19	28
0,4 ┤ 0,6	84	40	22	33	16	9
0,6 ┤ 0,8	139	91	8	54	35	3
0,8 ┤ 1,0	6	65	29	2	25	11
Total	**258**	**258**	**258**	**100**	**100**	**100**

Table 1: Absolute and percentage composition of municipalities by membership in fuzzy classes

In particular, the percentage of municipalities with high economic hardship (fuzzy value between 0.8 and 1) appears to be smaller (only six municipalities) than the value representing social hardship (65 municipalities). Two of the largest percentage values represent high economic and social hardship, respectively (fuzzy values between 0.6 and 0.8) compared to a percentage of municipalities with high housing poverty.

4. The DBSCAN approach

By integrating the fuzzy approach with clustering methods, it is possible to obtain areas of high (or low) intensity of the phenomenon that allow the aggregation of contiguous and homogeneous spatial units with respect to the phenomenon under study.

The basic idea of the first clustering method based on spatial density: DBSCAN (Density Based Spatial Clustering of Application with Noise) [Ester, M., Kriegel, H.-P., Sander, J., Xu, X., 2009] is to define a new cluster or extend an existing cluster, the surroundings of a point of a given radius ε, must contain at least a minimum number of MinPts. DBSCAN as input needs two parameters ε and MinPts to determine whether a group of points is a cluster or simply noise.

Having fixed k, is define a k -dist function, from the dataset D to the set of real numbers, that assigns to each point in D the distance to its k -th nearest neighbour. Then the points in the dataset are sorted in descending order with respect to k -dist,

resulting in a graph called the sorted k -dist graph.

This graph provides information about the density distribution of the dataset: in particular, by choosing an arbitrary point p and fixing MinPts to k and ε to k -dist(p), all points having equal or lesser k -dist will be core points.

Having chosen a threshold point on the graph, to which corresponds a value of k -dist and hence ε, all patterns preceding it turn out to be noise while those following it will be assigned to clusters.

The DBSCAN algorithm has been applied to municipalities to aggregate them based on the fuzzy value, even from different provinces to find spatially close and contiguous areas with similar characteristics to better organize spatial planning.

To define the optimal value of ε, the k nearest neighbour distances in a matrix of points were calculated. The idea was to calculate, the average of the distances of each point to its k nearest neighbours. The value of k was initialized equal to the same value of MinPts.

Next, these k-distances were plotted in ascending order, and the goal was to determine the inflection point corresponding to the optimal parameter. Figures 1, 2 and 3 show plots of the k-distances for each of the three sets of indicators, and the optimal value that was empirically chosen to assign to ε is highlighted. Increasing even slightly the value of ε concentrates the points into a single cluster, while decreasing the value of ε increases the noise points and increases the clusters. The three cartographies show in yellow the noise points, i.e., those not classified by the algorithm.

The first cartography, Figure 1, was processed by assigning the values obtained with the DBSCAN algorithm having assigned ε value 0.14, MinPts value 3 and using the fuzzy values of the first set of indicators related to economic poverty. Ten clusters highlighted with the various colours were obtained. The clusters formed by the municipalities with a higher fuzzy value and spatially close are those highlighted by the orange and yellow ochre colours and the blue corresponding to the areas of the provinces of Foggia and Taranto.

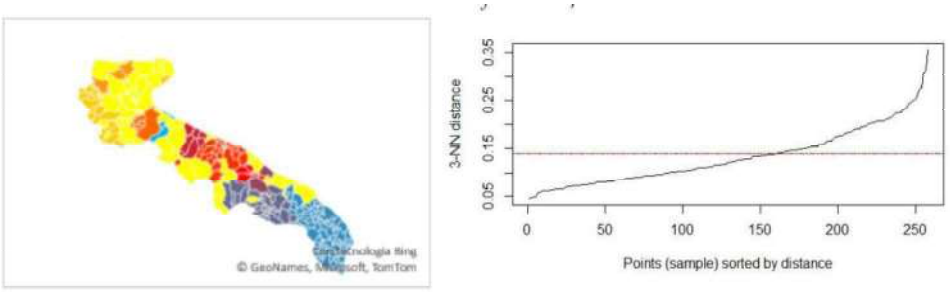

Figure 1: Identification of dense areas with DBSCAN: Economic Poverty (=0,14 and MinPts=3); Graph of k-distances for =0,14

The second cartography, Figure 2, was processed by assigning the values obtained with the DBSCAN algorithm having assigned ε value 0.176, MinPts value 3 and using the fuzzy values of the second set of indicators related to social poverty. Thirteen clusters were obtained, those formed by municipalities with a higher fuzzy value and spatially close are highlighted by orange and the yellow ochre and the blue colors corresponding to the areas of Foggia, Brindisi and Taranto.

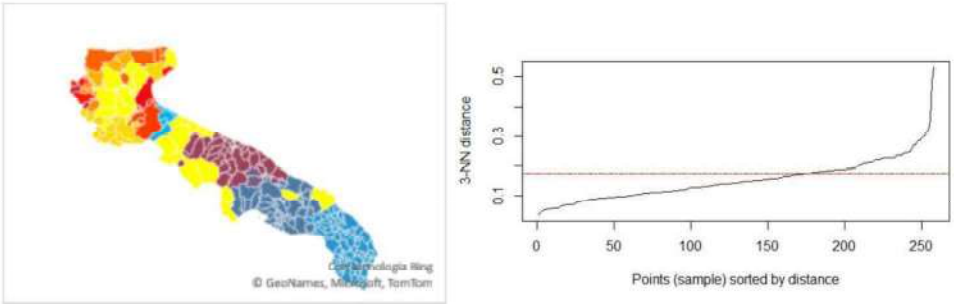

Figure 2: Identification of dense areas with DBSCAN: Social Poverty (=0,176 and MinPts=3); Graph of k-distances for =0,176

The third cartography, Figure 3, was processed by assigning the values obtained with the DBSCAN algorithm having assigned ε value 0.17, MinPts value 3 and using the fuzzy values of the third set of indicators related to housing poverty. 11 clusters highlighted with the various colors were obtained, those formed by the municipalities with a higher fuzzy value and spatially close are those highlighted by the red and blue colors in the areas of Foggia and Brindisi respectively.

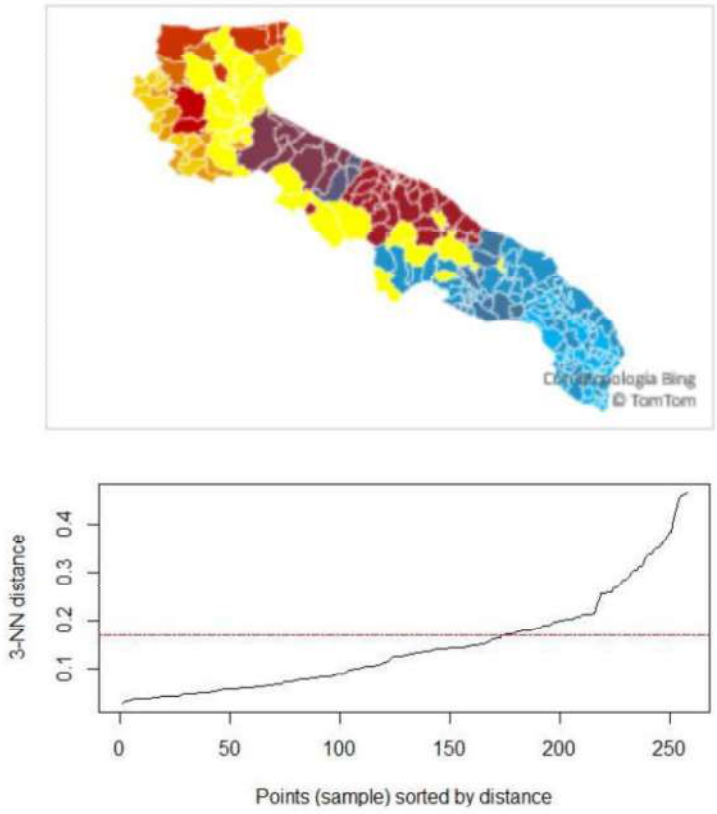

Figure 3: Identification of dense areas with DBSCAN: Housing Poverty (=0,17 and MinPts=3); Graph of k-distances for =0,17

4. Conclusions

When we talk about poverty, we highlight a discomfort that does not end only in the lack of monetary resources but concerns a plurality of social and economic dimensions and takes the form of the lack of fair access to a plurality of essential goods and services.

In international scientific reports, the need for a multidimensional analysis of poverty is highlighted, using not a single indicator, but a set of indicators, necessary to outline the living conditions of different individuals in a more correct way.

This work stems from the desire to describe territorial phenomena through an integrated model, which starts from the construction of socio-economic indicators, of

a multidimensional nature, and then adopts models capable of identifying areas at risk of hardship through statistical methods [Massari A., Perchinunno P., L'Abbate S., Mongelli L., 2022; Perchinunno, P., Massari, A., L'Abbate, S., Mongelli, L., 2022, Perchinunno, P., Rotondo, F., L'Abbate, S., Mongelli, L, 2022].

In this way, as with the data analysed, it is possible to evaluate the problematic aspects that characterize families in a specific historical, geographical, and social context, measure socio-economic hardship, identify new profiles of poverty and evaluate the impact of poverty on public institutions. In fact, the results presented in this document by the fuzzy and DBSCAN approaches show that almost always the same provinces need more attention from local policies. Focused government action would be needed to support these areas. Certainly, to reduce poverty, it is necessary to guarantee equal rights, access to economic and natural resources, technological resources, property and basic services.

References

Analisi della povertà relativa Siqual, Istat 1997 http://siqual.istat.it/SIQual/visualizza.do?id=8888916&refresh=true&language=IT

Cerioli, A., Zani, S.: A Fuzzy Approach to the Measurement of Poverty. In: Dagum, C., Zenga, M. (eds.) Income and Wealth Distribution, Inequality, and Poverty. Springer Verlag, Berlin (1990)

Cheli, B., Lemmi, A. A: Totally Fuzzy and Relative Approach to the Multidimensional Analysis of Poverty. Economic Notes vol. 24, n. 1, (1995) 115-134

Dubois, D., Prade, H.: Fuzzy sets and systems. Academic Press, Boston, New York London (1980)

Ester, M., Kriegel, H.-P., Sander, J., Xu, X. A Density-Based Algorithm for Discovering Clusters in Large Spatial Databases with Noise. Proc. 2nd Int. Conf. on Knowledge Discovery and Data Mining, Portland (1996)

La misura della povertà assoluta. Istat 2009 https://ebiblio.istat.it/digibib/Metodi%20e%20norme/MOD1546628Ed2009N39.pdf

Massari A., Perchinunno P., L'Abbate S., Mongelli L. Spatial Statistical Model for the Analysis of Poverty in Italy According to Sustainable Development Goals. In Lecture Notes in Computer Science, 13378 (2022)

Montrone, S., Perchinunno, P., Rotondo, F., Torre, C. M., Di Giuro, A.: Identifica-

tion of Hot Spots of Social and Housing Difficulty in Urban Areas: Scan Statistic for Housing Market and Urban Planning Policies. In: Murgante B., Borruso G., and Lapucci A. (eds.) Geocomputation and Urban Planning, Studies in Computational Intelligence, Vol. 176, 57-78. Springer Verlag Berlin Heidelberg: (2009)

Perchinunno, P., Rotondo, F., Torre, C. M.: "A Multivariate Fuzzy Analysis for the regeneration of urban poverty" In: Gervasi, Murgante, Laganà, Taniar, Mun, Gavrilova, (eds.) ICCSA 2008, Part I. LNCS, vol. 5072, 137-152, Springer, Heidelberg, (2008)Zadeh, L.A: Fuzzy sets, Information and Control. 8(3), 338-353. (1965)

Perchinunno, P., Massari, A., L'Abbate, S., Mongelli, L., Sustainable Development Goals per l'analisi statistica della povertà. Metodi e analisi statistiche, Dipartimento di Economia e Finanza, Università degli studi di Bari Aldo Moro. (2022)

Perchinunno, P., Rotondo, F., L'Abbate, S., Mongelli, L, Ecological transition, and sustainable development: integrated statistical indicators to support public policies. In Scientific Reports vol. 12:18513. (2022)

Digital Innovation in Public Administration: Statistical Analysis for the Governance Support

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Abstract: The digital transition and the Italian National Recovery and Resilience Plan (NRRP) are essential pillars for the digitization of Public Administration (PA) and the development of digital public services. The digitization of processes allows for a more efficient Public Administration that serves citizens and businesses and makes municipalities owners of interventions that benefit communities, citizens, and territories. The goal of the public administration is to promote investments in integrated digital technologies, infrastructures, and processes, also in collaboration with the private sector, to foster the country's growth and sustainable territorial development.

This paper intends to dwell on the digital innovation of Public Administration understood as technological evolution in IT and strategic marketing according to the axes declined at the European level and implemented by the NRRP. The focus was placed on the first mission of the NRRP, and indicators were chosen for each of the axes around which the main reform interventions revolve. The data were analysed at the regional level using a multivariate statistical methodology (Totally Fuzzy and Relative method) with the aim of assessing the level of digitization of the regions and evaluating how much the NRRP can impact for future territorial development.

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Keywords: Public administration, Digital innovation, Digital marketing, Fuzzy, NRRP.

1. Introduction

The events of recent years have provided a decisive acceleration to the digital transition. Companies, both public and private, have found themselves having to review their strategies considering a historic revolution that has highlighted several benefits dictated by the development and reshaping of an ever-changing market [Wirtz, B. W., Weyerer, J. C. e Geyer, C., 2019].

In Italy, the inability to address the challenges identified by the digital revolution has been one of the fundamental causes of the lag in business productivity growth [Criado, J.I., e Gil-Garcia, J.R., 2019]. However, the public sector has also faced critical issues related to scarce resources, the difficulty of setting up effective coordination between different levels of administration and respecting local autonomy [Eggers, W.D., 2017].

The European Innovation Scoreboard, prepared by the European Commission in 2021, provided a comparative analysis of innovation performance in European Union countries. Italy, due to its lag, was placed among the "moderate innovators," highlighting the correlation between the productivity defect and the low level of digitization and innovation. The Italian National Recovery and Resilience Plan (NRRP) is part of the Next Generation EU (NGEU) program, aims to overcome these obstacles by making available significant funding and recognizing a central role for municipalities in achieving digitization in Public Administration. The Plan is developed around three strategic axes shared at European level: digitalization and innovation, ecological planning, and social inclusion.

Specifically in this work, reference is made to Mission 1 (Digitalization, innovation, and security in public administration) under the National Recovery and Resilience Plan (NRRP) and then to the statistical indicators related to it. In this paper, the numerous available data were analyzed at a regional level through multivariate statistical methodology (Totally Fuzzy and Relative method) to evaluate the level of digitization of the regions and assess how much the NRRP can affect for future development. The regional size is a strategic one, both for the ability of the regions to direct the territorial policies and planning of the municipalities, and for their value as a synthesis of the level of their progress at the regional level.

2. Digital innovation in the NRRP

The European Union has launched the Next Generation EU strategy program, of which Italy is also a beneficiary, to outline a new model of socially and environmentally sustainable development. The National Plan for Recovery and Resilience (NRRP) enabled Italy to access funds under the Next Generation EU Strategy to "revitalize the country after the pandemic crisis, stimulate the ecological and digital transition, and encourage structural change in the economy, starting with the contrast of gender, territorial and generational inequalities". The plan distinguishes between horizontal reforms, that is, those that consist of "structural innovations in the system, suitable for improving effectiveness, efficiency and competitiveness," enabling reforms suitable for "removing administrative, regulatory and procedural obstacles," and sectoral reforms "designed to introduce more efficient regulatory and procedural regimes in their respective territorial areas". In the National Recovery and Resilience Plan ample space is devoted to digitization, both public administration and the production system. Thus, digitization of the PA is a primary goal, as part of the reforms conceived as enabling with respect to the plan's primary objectives.

Digitization of public administration plays a central role in the Plan. Digitization, innovation, and security in PA is one of the three components of Mission 1 called “Digitization, Innovation, Competitiveness, Culture and Tourism”.

The NRPP envisages a deep and articulated intervention strategy for the modernization of PA, ensuring its decisive improvement in terms of efficiency and effectiveness of processes through digitization, skills strengthening (of human capital in administrations) and drastic bureaucratic simplification.

The main reform interventions planned revolve around the following axes:

Access, to streamline and make selection procedures more effective and targeted and encourage generational turnover.

Good administration, to simplify rules and procedures.

Skills, to align organizational knowledge and skills with the new needs of the world of work and a modern administration.

Digitization, as a cross-cutting tool to better implement these reforms.

The first point aims to reform PA personnel selection mechanisms, including through a new digital portal that facilitates strategic human capital planning for central and local governments and enables performance monitoring of individuals and organizations.

The second action aims to ensure the immediate modification of some specific

procedures to simplify and speed up the start of the implementation phase of the NRRP. The planned reforms and investments aim to define and implement a set of interventions designed to simplify and accelerate, through the elimination or easing of bureaucratic constraints, the actions of public administrations, making them more effective and efficient, reducing waiting times and costs for citizens and businesses.

The third axis aims to develop within PA a human capital of absolute excellence by funding a strong plan for talent attraction, selection, recruitment, retention, and evaluation, renewing current career mechanisms (vertical and horizontal), and re-organizing current training models.

The objectives envisaged in the last action concern the consolidation of a core of high-level skills for the rationalization of administrative action through technological and organizational innovation and the enhancement of the digital skills already present in the administration, allowing them to be expanded and strengthened. These axes were described through indicators and elaborated through a multidimensional and spatial statistical approach. Thus, enabling the full digitization of internal PA processes through the re-engineering of administrative procedures as well as the development of new technological infrastructure and digital services. The effective implementation and use of digital tools makes it possible to improve both the internal processes of public administrations and the relations that public administrations have with the external environment [Homburg, V., 2018].

The PA reform envisaged by the NRRP is a priority, as "reform instrumental to the achievement of the objectives contained in the three strategic axes: digital transition, ecological transition and social inclusion within which lie policies to reduce the territorial gap" [Giannelli, N., 2021].

3. Digital marketing in public administration

Digital marketing is a blanket term for the targeted, measurable, and interactive marketing of goods or services using digital technologies to reach and convert leads into customers and preserve them. The main objective is to promote brands, shape preference and boost sales through several digital marketing techniques [Varbanova, L., 2013].

Alternative terms for digital marketing are often: 'online marketing', 'internet marketing' or 'web marketing'. The fundamental concept in digital marketing is based on the inbound marketing approach or generally it's called customer centric

approach.

Inbound marketing means to promote a business through blogs, podcasts, video, eBooks, newsletters, whitepapers, SEO, physical products, social media marketing, and other methods of content marketing which serve to interest customers through the different stages of the purchase funnel. Inbound marketing means marketing activities that bring visitors in, earning the attention of consumers, making the business easy to be found, and drawing customers to the website by generating stimulating content [Halligan, B., 2009].

If technology continues to advance, digital marketing will as advance as well. Digital marketing is like traditional advertising, but the main difference is in the use of digital devices. Among the advantages of digital marketing is the interactivity between users who can choose when to initiate contact and for how long. Users representing an infinite audience: we know that the web, for example, can reach an entire globe, but, if necessary, it is also possible to customize a digital campaign to reach a local network. Cost efficiency is noted as another positive aspect compared to traditional mass media marketing as digital marketing has much lower costs and in many cases, websites can also generate traffic for free.

On the web, online content is offered to users on an ongoing basis, and they choose to consume it or not [Wsi, 2013]. In fact, online marketing allows collaboration between users and gives the right to free expression of one's opinion regarding the product/service through practically unlimited contents and through the possibility of easily updating the contents when necessary. Furthermore, measurability is easy: digital technologies allow measuring the impact very easily compared to traditional marketing, adaptability, and personalization. Certainly, digital marketing also has negative effects, including the ease of how internet marketing campaigns can be easily copied by a competitor. Brands or logos can be used to defraud customers. The poor physical perception of e-commerce which does not allow the user to "touch" the goods before buying them.

Often there is a perceived lack of user trust due to the large number of frauds related to virtual promotions. Honest companies can suffer as their image and reputation for quality can be damaged.

Internet marketing is not yet embraced by all people: some customers, especially older ones, still don't trust the digital environment, preferring to use traditional methods.

4. Material and methods

Data provided by the ISTAT survey "Survey on Survey on Local Public Administration and ICT - Year 2018" conducted in the summer of 2019, were used to verify the level of digitalization of Italian municipalities and the status of implementation of regulatory requirements. The survey can be considered representative of the universe of Italian local governments since 6.117 municipalities participated out of a total of 7.954, or 77 %, selected on a census and sample basis [ISTAT, 2000].

The indicators were chosen based on their relevance to the objectives of the mission and on the availability of data on a regional basis update to 2018. The following indicators were chosen for each of the axes described in section 2 (note that for the first axis, no updated indicators useful for our study were found):

B) Good administration: simplification of rules and procedures

Municipalities making open data available

Municipalities that use analogue protocols

Municipalities that during 2018 have made purchases in e-procurement mode

Municipalities which have submitted tenders electronically

Municipalities for levels of availability of the services offered online (start and end of the entire process electronically)

C) Skills: alignment of knowledge and organizational skills of civil servants with the new demands of the world of work and modern administration

Municipalities with their own offices/data processing services

Municipalities with employees who participated in ICT training

Municipalities where staff have participated in training activities in the eGovernment area (Digitalization of internal flows and processes)

Municipalities where staff have participated in training activities in the eGovernment area (Web services, multimedia, social media)

Municipalities who have formally appointed a Digital Transition Manager (RTD), appointed within the PAL

D) Digitalization: use of new technologies as a transversal tool for better implementation of reforms

- Municipalities for main technological equipment used (laptops)
- Municipalities with main technological equipment used (wireless local area networks)
- Municipalities using open source solutions
- Municipalities using VoIP technology
- Municipalities using cloud computing services.

The Total Fuzzy and Relative method was applied to the data of all the Italian regions. The fuzzy TFR approach consists in defining the measurement of an individual's degree of belonging to the totality fuzzy, included in the interval between 0 (with an individual who does not demonstrate a clear belonging) and 1 (with an individual who demonstrates a clear belonging).

If we suppose to observe k indicators for each family, the function of belonging of the i-th family to the blurred subset can be defined as follows:

$$f(x_{i.}) = \frac{\sum_{j=1}^{k} g(x_{ij}).w_j}{\sum_{j=1}^{k} w_j} \qquad i = 1,.....,n$$

where g(xij) measures the probability of membership of each unit and wj derives from a weighting system, as given by generalizing the one proposed by Cerioli and Zani [10]:

$$w_j = \ln\left[1/\overline{g(x_j)}\right], \qquad \text{where} \quad \overline{g(x_j)} = \frac{\sum_{i=1}^{n} g(x_{ij})}{n} \qquad (j = 1,2,...,k).$$

5. Results of the application of TFR method

For each set of indicators, the fuzzy value and its values attached to it have been calculated. Of particular interest is the analysis of wi weights that indicate the relevance of the indicator on the considered set. As already specified, high values of the weight denote a strongly discriminating condition in the determination of the result.

In our case the values of the weights of the indicators relating to Municipalities with employees who participated in ICT training (wi = 0.4), and those relating to Municipalities who have formally appointed a Head for Digital Transition (RTD) Appointed within PAL (wi = 0.4) and the Communes with autonomous offices /infographic services (wi = 0.3) are discriminatory against other indicators. Conversely, the weights of other indicators (all equal to wi = 0.2) appear less discrimi-

nating.

Applying the Total Fuzzy and Relative method on the data of all Italian regions, as described in the previous paragraph, three synthetic indices were obtained that describe the territorial distribution of the indicators that are represented in the Figure 1. It thus emerges that for the first set related to the indicators of "Good administration" most of the regions are in a good condition while 3 regions don't have good digital administration (Sardegna, Abruzzo and Veneto). The performance of southern regions such as Campania and Sicily is interesting, which bodes well in terms of reducing territorial differences.

Figure 1. Territorial distribution by region of the fuzzy values for first set of indicators ("Good administration").

Figure 2. Territorial distribution by region of the fuzzy values for second set of indicators ("Skills")

Finally, for the third set of indicators related of "Digitalization" (Figure 3) more than half of the number of regions has good digitalization with a high fuzzy value; in particular, 5 regions (Friuli – Venezia Giulia, Emilia-Romagna, Toscana, Province of Bolzano and Valle d'Aosta). The performance of southern regions such as Calabria and Sicily is interesting for an increase in the level of territorial cohesion.

Figure 3. Territorial distribution by region of the fuzzy values for third set of indicators ("Digitalization")

6. Results of the application of TFR method

The results of the fuzzy analysis developed in this work show that it is necessary to integrate the usual methods of distributing funds of NRRP with adequate tools for territorial rebalancing that, for each aspect, can support precisely the regions that start from the most disadvantaged situations.

From the analysis carried out in this work it emerges that not in all cases the territorial disparities reproduce the classic gap between North and South, but the disparities are also distributed within the two classic Italian macro-areas [Viesti, 2021].

Even the competitive criterion that is being used in the calls already issued for the implementation of the NRRP risks increasing these disparities because it is likely that those regions which are more economically equipped and with greater capacity to respond to competitive calls (because, for example, equipped with a larger, more competent, or better trained regional bureaucracy) can draw more resources [Perchinunno P., Massari A., L'Abbate S., Mongelli L., 2023].

In conclusion, we are now aware that the conditions for rebalancing different starting situations don't arise spontaneously, especially in the weaker areas, but require careful public policies that contribute to creating them. Taking note, also from the results of this study, about the different starting situations of the Italian regions, with respect to the digital innovation objectives, it is necessary to commit to distribute the huge resources of the NRRP also considering these imbalances [Passaro P., Perchinunno P., Rotondo F., 2023]. The challenge of the smart regions, then, is no longer just that of generating improvement in the offer of public services by conforming them to the criteria of adequacy, but also that of building an immaterial infrastructure which, thanks to the use of new technological tools, connects public administrations, people and objects and plurality of networks.

References

Cerioli, A., Zani, S. (1990) A Fuzzy Approach to the Measurement of Poverty. In: Dagum, C., Zenga, M. (eds.) Income and Wealth Distribution, inequality and Poverty. Springer Verlag, Berlin

Criado, J.I., e Gil-Garcia, J.R. (2019), Creating public value through smart technologies and strategies. From digital services to artificial intelligence and beyond. International Journal of Public Sector Management, Vol. 32 No. 5, 438-

450.
Eggers, W.D. (2017), Pubblica amministrazione digitale: Innovazioni e tecnologie al servizio del cittadino, Milano, Hoepli.
Giannelli, N. (2021), Il cammino delle riforme della Pubblica amministrazione nella svolta pragmatica del PNRR, in «Studi Urbinati, Scienze giuridiche, politiche ed economiche», 72(3-4), pp. 25-56.
Halligan, B., 2009. Inbound marketing: get found of Google, Social Media and Blogs. New York: John Wiley &Sons, p. 11.
Homburg, V. (2018), Ict, e-government and E-governance: Bits & Bytes for Public Administration, in E., Ongaro e Van Thiel, S. (a cura di), The Palgrave Handbook of Public Administration and Management in Europe, London, Palgrave Macmillan, pp. 347-361.
ISTAT (2000) Survey on Local Public Administration and ICT - Year 2018
Passaro P., Perchinunno P., Rotondo F. (2023) Statistical analysis of the circular economy for the intervention policies of the NRRP. British Food Journal. https://www.emerald.com/insight/0007-070X.htm
Perchinunno P., Massari A., L'Abbate S., Mongelli L. (2023). Ecological Transition and Sustainable Development, a Multivariate Statistical Analysis to Guide the Policies of the National Recovery and Resilience Plan. Social indicators https://doi.org/10.1007/s11205-023-03078-w
Varbanova, L., 2013. Strategic Management in the Arts. New York: Taylor and Francis, p. 161.
Viesti G. (2021). Centri e periferie. Europa, Italia, Mezzogiorno. Dal XX al XXI secolo. Bari-Roma: Editori Laterza.
Wirtz, B. W., Weyerer, J. C. e Geyer, C. (2019), Artificial Intelligence and the Public Sector—Applications and Challenges, in «International Journal of Public Administration», 42(7), pp. 596-615.
Wsi, 2013. Digital Minds: 12 Things Every Business Needs to Know about Digital Marketing. Victoria: Friesen Press, p. 7.

Machine Learning techniques for Hydroponic Cultures

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Abstract: Hydroponics is an innovative agricultural technique that enables the cultivation of plants without the use of soil, providing controlled conditions for optimal plant growth. In recent years, machine learning (ML) techniques have gained prominence in various domains, including agriculture, due to their ability to analyze large datasets and derive valuable insights: the combination of ML and the opportunity to control all the inputs in an hydroponic cultivation represents an invaluable chance to reduce resource requirements and increase the production in line with the constraints imposed by climate change. In this work, we tested four different machine learning models, namely, random forest (RF), support vector machine (SVM), extreme gradient boosting (XGB) and a neural network. These models were tested in two different scenarios considering two sets of variables. The first scenario is done considering all the features of the dataset while the second scenario is characterized only by the features that can be measured during the cultivation. The best result is obtained in the second scenario with extreme gradient boosting (XGB) that achieved a value of 8.37 for mean absolute error (MAE), 8.20 for mean bias error (MBE) and 13.16 for root mean square error (RMSE).

Keywords: Hydroponic Cultures, Machine Learning, innovative agricultural techniques.

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1. Introduction

The climate change represents a urgent and complex problem that can impact human life in different ways, but the main challenge is related to food supply due to land and water scarcity. According to the Organisation for Economic Cooperation and Development (OECD), farming accounts for around 70% of water used in the world and contributes to water pollution from excess nutrients, pesticides and other pollutants.

For this reason, sustainable management of water in agriculture becomes a critical challenge to address water scarcity and a global focus for every country. In this context, technology has made important steps proposing new frameworks that improve the current usage of resources such as hydroponic, aeroponic and aquaponic systems. All these apparatuses require careful implementations, and several modelling decisions must be taken into consideration to reach the best performance in terms of production.

In this landscape, Machine Learning techniques are acquiring a central role. In fact, we can leverage these methodologies to clarify the effect of each component in a controlled environment.

The purpose of this paper is to analyse the data of a tomato crop in an hydroponic setup to highlight the possible benefits of this procedure and the plausible extension to other cultivations.

2. Literature Review and Related works

Technology has always played a central role when it comes to agricultural applications and it has driven huge changes during the history. However, only in the recent years has been possible to leverage internet applications and huge compute resources to gain relevant insights. Impedovo e at. [Impedovo et al., 2018] showed how to manage heterogeneous information and data coming from real dataset that collect physical, bi-
ological and sensory values. Signore et al [Signore et al., 2018] designed and implemented an experiment in "la Noria" Farm of the Institute of Science of Food Production of the National Research Council using the Nutrient Film Technique (NFT) for an hybrid variety of cherry tomato. The data were public and accessible through the portal Mendeley Data and they were used after a careful manipulation for this study.

Please refer to the previous paper for a detailed description of the setup.

Signore et al in [Signore et al] leveraged the same data to describe a precise management of the nutrient solution that allowed discarding a lesser amount of water and nutrients into the environment, improving the sustainability of the crop in a Mediterranean environment. Meshram et al. in [Meshram et al., 2021] presented an extended survey on the latest machine learning application in agriculture to alleviate the problems in the tree areas of pre-harvesting, harvesting and post-harvesting.

El-Ssawy , Al-Anasari e al. in [Mokhtar et al., 2021] applied machine learning models to an hydroponically grown lettuce yield and serves as a point of reference for our study.

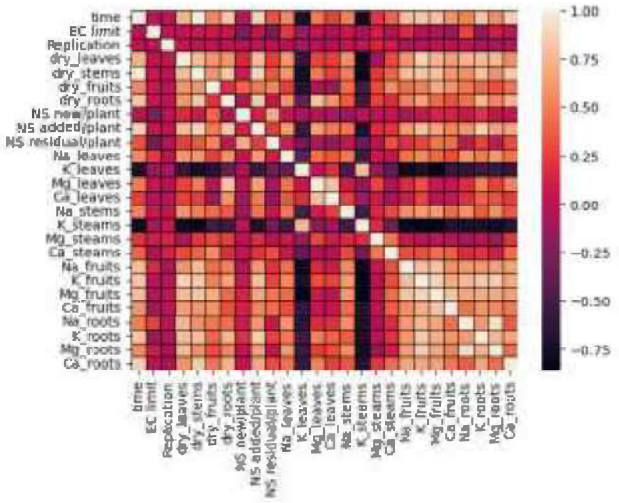

Figure 1 – Correlation Matrix

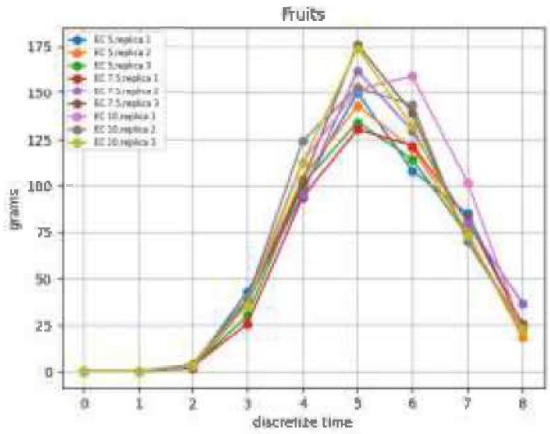

Figure 2 – Dry Fruit curves

3. Proposed Methodology

The data went through a pre-processing phase to aggregate all the relevant information considering a discrete time period representation and summing all the quantities within the relative time window. A brief initial data analysis allowed to gain relevant insight on the data.

Considering the correlation matrix in Figure 1, we can notice how the weight of the fruit is related to the period and to the Potassium, in line with the scientific information on this crop that suggests that this nutrient has a positive impact on both the size and the color of the fruit [Weinert et al., 2021]. Two scenarios were taken into account to compare the performances of the methods where a different number of independent variables is considered. In particular, the second scenario we omitted all the quantities related to the fruits in order to consider a more realistic scenario.

We compare the performances using three distinct metrics:

- Mean Absolute Error (MAE)= $\frac{1}{n}\sum_{i=1}^{n}|y_i-\hat{y}_i|$
- Mean Bias Error (MBE) = $\frac{1}{n}\sum_{i=1}^{n}(y_i-\hat{y}_i)$
- Root Mean Square Error (RMSE) = $\sqrt{\frac{1}{n}\sum_{i=1}^{n}(y_i-\hat{y}_i)^2}$

The data were splitted into train,validation and test with the proportion 80%,

10% and 10% considering a random time instant for each sample in both test and validation.

The analysis considered Random Forest, Support Vecotr Machine, Extreme Gradient Boosting and a Deep neural Netowork in both scenarios. Each framework was optimized by means of a grid search to ensure an optimal choice of the parameters and hyperparameters.

3.1 Machine Learning Models descriptions

3.1.1 Support Vector Machine

The Support Vector Machine (SVM) algorithm offers significant results with minimal computational requirements.

In SVM, every data record represents a point in a feature space with p dimensions, where p is the number of features.

When p is 2 like in Figure 3, SVM identifies a line that maximizes the distance from the nearest point in each category to this line. However, when p is greater than 2, SVM finds a hyperplane that optimally separates the data points belonging to each category, known as the Maximum Margin Hyperplane (MMH) in the sense that it minimizes the error.

The data points closest to the MMH, called Support Vectors (SV), define the MMH and serve as a compact representation of the model. Each category must have at least one SV, but it can have multiple SVs. By mapping a new data record onto the corresponding region, SVM predicts its category, effectively combining elements of nearest neighbour and regression methods. The amalgamation of these techniques in SVM enables the modelling of intricate data relationships.

3.1.2 Support Vector Machine

Random Forest (RF) is an enhanced version of a decision tree algorithm that combines the fundamental principles of bagging with random feature selection to introduce additional diversity to the decision tree models. Decision tree learners are robust predictive models that employ a tree- like structure to establish relationships between features and outcomes. This structure resembles a tree starting with a broad trunk and branching into narrower branches as it extends upwards.

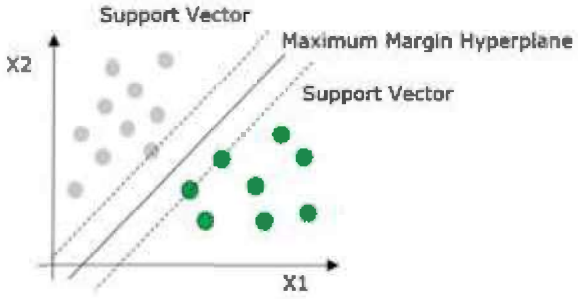

Figure 3 - Support Vector Machine (from UNECE, "Learning for Official Statistics", 2021

Similarly, a decision tree learner utilizes branching decisions to guide examples towards a final predicted class value. While a decision tree is built on the entire dataset, incorporating all relevant features, RF randomly selects observations and specific features to construct multiple decision trees, subsequently averaging the results for making predictions. In the RF model, the Gini Coefficient is employed. The Gini coefficient determines how nodes branch in a decision tree and is calculated as follows:

$$Gini = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}|x_i - x_j|}{2n^2\bar{x}} \tag{1}$$

where "n" represents the number of observations. Similarly, entropy is another indicator that governs node branching in a decision tree and is calculated as:

$$E_{Split} = \frac{N_1}{N}E_1 + \frac{N_2}{N}E_2 \tag{2}$$

where N_1 and N_2 are the numbers of items in each set after the split, and E_1 and E_2 are their corresponding entropies.

Random Forest offers several advantages over other machine learning algorithms. It selectively chooses essential features and can be effectively applied to datasets with an exceptionally large number of features. Figure 4 illustrates a schematic diagram of the RF model. The final predicted value in the RF model is

obtained by averaging the predictions from all individual trees.

3.1.3. Extreme Gradient Boosting

Introduced in 2016, eXtreme Gradient Boosting (XGB) has gained immense popularity as a machine learning technique. Boosting, the core concept behind XGB, involves adding new models to the ensemble in a sequential manner.

This technique enhances the bias-variance tradeoff by initially employing a weak model and progressively improving its performance by constructing new trees. Each subsequent tree aims to address the most significant errors made by the previous one. XGB represents a noteworthy advancement in Gradient Boosting. Figure 5 illustrates the schematic diagram of the XGB model.

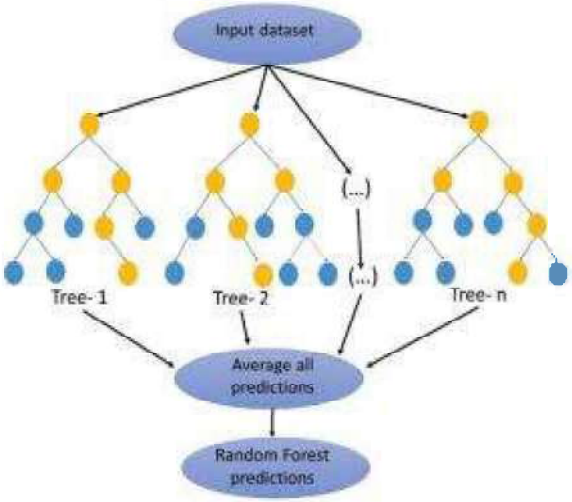

Figure 4: Random Forest diagram (from Sahour et a., "Random forest and extreme gradient boosting algorithms for streamfow modeling using vessel features and tree-rings", 2021.

The process of gradient boosting begins with a set of predictors (X_1,...,X_n) used to predict the corresponding target values (Y_1,...,Y_n). We train a model F(X) → Y and minimize the sum of the loss function $J = \sum_{i=1}^{n} L(Y_i, F(X_i))$, to enhance the

model F(X). The loss function L measures the difference between the prediction F(X) and the target Y and is a differentiable convex function. The following iterations are performed: firstly, we calculate the negative gradients of J with respect to $F(X_i)$, denoted as $-\frac{\partial J}{\partial F(X_i)}$. Next, a regression tree h is fitted to the negative gradients $-\frac{\partial J}{\partial F(X_i)}$. Finally, F(Xi) is updated by adding γh, where γ is the step size used to approach the estimated minimum of J. This iterative process continues until the desired accuracy is achieved. In XGB, the loss function is defined as follows:

$$J = \sum_{i=1}^{n} L(Y_i, F(X_i)) + \Omega(h) \tag{3}$$

where $\Omega(h) = \gamma T + \frac{1}{2}\lambda||\omega||^2$. Here, T represents the number of leaves in the tree, and ω corresponds to the leaf weights.

Variable Importance (VI) quantifies the statistical significance of each variable in the data concerning its impact on the generated model. It represents the ranking of each predictor based on its contribution to the model. The calculation of variable importance involves measuring the decrease in error when the data is split by a particular variable. Subsequently, the relative importance is determined by dividing the variable importance by the highest value of variable importance, ensuring that the values are confined within the range of 0 and 1. In tree-based regression models such as Random Forest (RF) and XGB, the measure of VI is determined by the frequency of a variable being selected for splitting and the extent to which the model improves as a result of the split.

3.1.4. Extreme Gradient Boosting

An Artificial Neural Network (ANN) or Deep Neural Networks (DNN) comprises interconnected nodes known as ”artificial neurons” that aim to mimic the neurons found in the human brain. These neurons are usually organized into layers, with each layer potentially performing distinct transformations on its inputs. The flow of signals starts from the initial layer, known as the input layer, and propagates through the subsequent layers, eventually reaching the final layer, referred to as the output layer. In some cases, the signals may traverse through the layers multiple times during the network’s processing.

Each node within the network receives a set of m inputs, denoted as xi, which

undergoes processing through the application of weights wi and the addition of a bias term. This computation is performed using the equation $s = (\sum_{i=1} mw_i x_i) + bias =$. Subsequently, an activation function φ is applied to the resulting value s, producing the output of the neuron, denoted as $y = \varphi(s)$. This output is then transmitted to other nodes within the network.

Depending on the specific application, various types of activation functions can be utilized, resulting in discrete or continuous outputs that may be bounded or unbounded. In our experiment we used the ReLu which is definited as:

$$ReLu(y) = \begin{cases} y, & \text{if } y \geq 0 \\ 0, & \text{if } y < 0 \end{cases} \tag{4}$$

Several advanced machine learning algorithms are founded on the principles of DNNs, showcasing their effectiveness in learning complex patterns within datasets. However, it is important to note that larger DNNs often require significant computational power, necessitating investments in hardware such as CPUs or GPUs.

A Multi-Layer Perceptron (MLP) is a type of feedforward Artificial Neural Network (ANN) that includes one or more hidden layers. In an MLP, signals flow from the input layer through the hidden layers and ultimately reach the output layer, hence the term "feedforward". Each node, except for the input nodes, functions as a neuron, while each input node represents a distinct feature of the dataset. The input value of a feature is propagated to the first node, which combines and processes the received inputs and applies an activation function to transform the result. This transformed output is then passed to the subsequent layer.

To ensure effective performance, MLPs need to be trained using a training set where the desired outputs are known. The training process involves iteratively adjusting the weights used by the artificial neurons, typically through a technique called "Backpropagation". Backpropagation aims to minimize a loss function, such as the average squared difference between the predicted and actual outputs, by updating the weights. This iterative adjustment of weights is often carried out using a gradient descent method, which makes incremental changes based on the results obtained from each successive data point in the training set. The learning rate, a hyperparameter of MLP, controls the speed of the weight updates.

The complexity of an MLP determines its ability to recognize complex relationships within the data. However, it's important to note that as the MLP becomes more intricate, the computational requirements increase significantly due to the number of layers and neurons in each layer.

4. Results and discussion

Given the numerosity of the sample, the results come with no surprise: a Neural Network is not suited for this dataset due to the large number of parameters that typically require more examples to reach competitive performances. On the other hand, Random Forest and Extreme Gradient Boosting have shown better performances with respect to Support Vector Machine. In this case, Extreme Gradient Boosting is the best method on average, reaching very low errors in scenario 2 as the tables shows.

It worth noticing that the importance assigned to the variable" time" (Figure 7) was considered the most influential one in both scenarios the XGB and the variable "EC limit", which gives an indication of the salinity level of the water used, was not considered a central feature. This last result confirms the resistance of certain hydroponic plants to different levels of salinity in accordance with the literature.

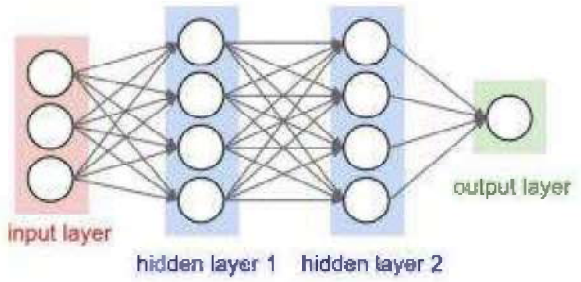

Figure 6: Deep Neural Network, image from Dashanka Nadeeshan De Silva , Multilayer Perceptron with Pytorch Github Repository

Method	Scenario	MAE	MBE	RMSE
RF	1	11.60	8.10	16.29
SVM	1	19.63	17.17	24.66
XGB	1	10.55	6.71	15.08
DNN	1	18.89	12.73	22.26
RF	2	13.70	11.63	20.46
SVM	2	17.23	14.10	23.24
XGB	2	8.37	8.20	13.16
DNN	2	16.40	8.72	23.47

Table 1: Results of the Models

It is also important to state that the reduced numerosity of the dataset does not allow to draw clear conclusions on both the analysis and both the analysis and the quantification of the errors might be taken into account using a larger dataset to provide some confidence levels on the results.

5. Conclusion and Future Works

The study shows how different machine learning techniques can be employed to exploit the information stored in agricultural data and in particular for hydroponic setups. The usage of advanced machine learning techniques rely on the availability of large amount of data that are very expensive for this kind of experiments. For this reason, the research require the active participation of both state institutions and private firms to maximize the diffusion of the data and ensure a concrete pervasiveness, considering that food supply represents a central asset for each nation. DNN could be used for each plant variety to address specific problems related to the management of the Nutrient solution, the regulation of the temperature and all the other parameters the directly affects the growth. Future works might consider the introduction of robotic systems based on Artificial Intelligence algorithm integrating them into the process of production.

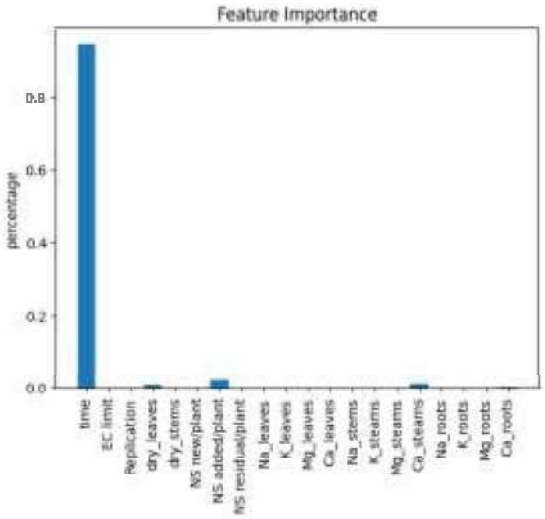

Figure 7: Variables Importance

References

Balducci F., Impedovo D., Pirlo G., "Machine Learning Applications on Agricultural Dataset for Smart Farm Enhancement", 2018.

Signore A., Serio F., Santamaria P., " A Targeted Management of Nutrient Solution in a Soilless Tomato Crop According to Plant Needs", 2016.

Signore A., Serio F., Santamaria P., "Growth Analysis and Nutrient Solution Management of Soil-less Tomato Crop in a Mediterranean Environment.

Meshram V., Patil K., Meshram V., Hanchate D., Ramkteke S.D.," Machine learing in agriculture domain: A state-of-art survey",2021.

Mokhtar A., El-Ssawy W., He H., Al-Anasari N., Sammen S. S., Gyasi-

Agyei Y., Abuarab M.," Using Machine Learning Models to Predict Hydroponically Grown Lettuce Yield", in 2022.

Weinert C.H., Sonntag F., Egert B., Pawelzik E., Kulling S. E. , Smit I., "The effect of potassium fertilization on the metabolite profile of tomato fruit (Solanum lycopersicum L.)" ,2021.

Do corporate governance characteristics affect respect for human rights?

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Abstract: The last thirty years have been characterized by a growing interest in sustainability issues. However, although the quantity and quality of socio-environmental information disclosed by companies is increasing, it was found that the issue of human rights was often omitted or overlooked in non-financial reports. The numerous cases of confirmed human rights violations have drawn attention to the possible compatibility of business and respect for rights, and to the effectiveness of introducing forms of mandatory disclosure. In this context, it should be noted that corporate governance plays a fundamental role in ensuring respect for human rights, as it can set policies to promote and protect human rights in the broadest sense, while also establishing systems to monitor and suppress human rights violations. The purpose of this paper is to examine whether and how some features of corporate governance, in particular the composition of the board of directors, exert an influence on respect for human rights. The quantitative analysis is conducted on companies belonging to the STOXX600 index, which includes the largest companies in Europe in terms of market capitalization. The results show that some of the assumed relationships are not always confirmed. This paper enhances the existing literature and provides valuable insights for managers, regulators, and policymakers.

Keywords: human rights score, corporate governance, board characteristics, CSR committee, European companies.

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1. Introduction

Corporate respect for human rights is a crucial issue in the current economic environment (McPhail and Adams, 2016). First, it is an ethical issue related to the mission, vision and values by which companies are governed. In an increasingly interconnected and global world, companies adopt a stakeholder-centred approach and are committed to ensuring that their activities do not compromise the dignity, freedom and well-being of stakeholders, nor contribute to human rights abuses. In this context, adopting responsible business practises that respect human rights promotes the common good while positively impacting the reputation, sustainability, longevity and performance of the companies themselves (Freeman, 2010; Gray and Gray, 2011; Buhmann et al., 2019). Secondly, promoting gender equality, ensuring decent working conditions along supply chains, avoiding the exploitation of workers and preventing abuse is not only an ethical duty, but also an investment in a more just and equitable future. Respect for human rights principles, as set out in international agreements and standards of conduct, not only reflects corporate social responsibility, but can also lay the foundation for a sustainable and equitable economy in which economic success is linked to empathy, social justice and respect for human dignity (Mayer, 2009; Wettstein, 2012).

Although respect for human rights is central to corporate success, cases of violations of these rights by companies that appear to aim to maximise profits for shareholders at the expense of human rights are reported in the news (Chamberlain, 2011; Clarke, 2015; Butler, 2016; Perkiss et al., 2021). In other cases, the violations involve companies that still need to improve the policies and/or procedures they have already put in place to comply with these principles (Schrempf-Stirling and Wettstein, 2017).

The importance of respect for human rights has been gradually recognised and taken into account through the increasing development of legislation. The Universal Declaration of Human Rights, adopted by the United Nations General Assembly in 1948, is the most important document that has inspired the subsequent development of international conventions or specific rules at country level. However, it was not until 2011, with the adoption of United Nations Guiding Principles on Business and Human Rights, that respect for these rights was actually urged. These principles oblige companies to respect human rights, not to contribute to human rights abuses and to address the negative consequences of their activities (Ruggie and Des Nations, 2011). In parallel, the development of corporate social responsibility (CSR) has highlighted the responsibility of companies to go beyond mere

compliance with the law and promote voluntary action to improve social, environmental and economic conditions in the communities in which they operate. This has led to an increase in responsible business practises and the subsequent disclosure of these activities in environmental and sustainability reports (Milne and Gray, 2013; Cho et al., 2015). Today, the issue of companies' respect for human rights is comprehensively addressed in key reporting standards or regulatory measures such as the GRI Guidelines or Directive 2014/95/EU on disclosure of non-financial and diversity information. Another important development was the inclusion of human rights in the United Nations Sustainable Development Goals (SDGs) adopted in 2015 (Winkler and Williams, 2017; Matuszak and Różańska, 2021).

Although the issue of human rights has been at the centre of policy and regulatory debate globally for many years, studies and research on this topic have only recently been conducted and, moreover, appear to be limited and in need of further investigation (Everett et al., 2015; Giuliani et al., 2016; Lopatta et al., 2022).

The aim of this paper is to examine whether and how some features of corporate governance, in particular the structure of the board of directors, have an impact on respect for human rights, considering that no study has been conducted on this topic so far. The analysis refers to the major European companies belonging to the STOXX600 index for the following reasons. The largest companies are more interested in the issue of respect for human rights, both considering the number of violations and the obligation to disclose information on the subject. In this regard, it should be noted that large European companies are obliged to publish a non-financial statement in which they also provide information on human rights.

The remainder of this article is structured as follows. The next section describes the theoretical background and presents the research hypotheses. Section 3 explains the sample and methodology, while section 5 presents and discusses the results. Finally, section 5 draws conclusions.

2. Theoretical background and hypotheses development

Previous studies that have examined the relationship between business and human rights have mainly focused on the description of corporate policies and regulatory justification rather than empirical research (Schrempf-Stirling and Van Buren; 2017). From the literature, qualitative studies (Arkani and Theobald, 2005; McBeth and Joseph, 2005; Morrison and Vermijs, 2011; Obara, 2017) predominate compared to quantitative studies (Preuss and Brown, 2012; Whelan and Muthuri, 2017;

Parsa et al., 2018), which found that external pressures and cultural changes are the main drivers that promote respect for human rights. The growing importance given to non-financial disclosure tools has encouraged the development of studies that have addressed the disclosure of these rights, highlighting that there is still a lack of quality and quantity of information on this topic (Lopatta et al., 2022). Empirical findings show that companies report and address workers' rights more frequently and, in more detail, (Preuss and Brown, 2012; Whelan and Muthuri, 2017). The limited research that has looked at the determinants of corporate commitment to respect human rights has found that the key drivers are public pressure and ethical and economic factors. However, it is important to note that much of this research has a specific focus on certain countries or types of companies, or on a small number of companies observed. Therefore, the corresponding results are difficult to generalise (Preuss and Brown, 2012; Lopatta et al., 2022). The issue of corporate governance is not analysed. Hence, as expected, this study aims to fill this research gap.

Corporate governance plays a central role in respecting human rights, both in terms of business ethics and in terms of risk management for the occurrence of abuses and/or violations of these rights (Elkington, 2006; Muchlinski, 2012). One of the most important corporate governance bodies is the board of directors. First, the board has a strategic function, which it performs by helping to formulate the overall strategy of the company. Secondly, however, the board also has a monitoring function for management by interacting with and evaluating top management to prevent opportunistic behaviour (Bathala and Rao, 1995; Vitolla et al., 2020).

Previous studies in the field of non-financial disclosure and CSR suggest that larger boards have a greater diversity of experience and opinion, which has a positive impact on the ability to monitor and improve the company's sustainability decisions. Hidalgo et al. (2011) emphasise that the larger size of the board favours deep debates and constructive engagement on ethical issues. At the same time, a large board can count on members with specialised skills in relevant and diversified areas. Therefore, it can be argued that a broad board can further promote respect for human rights by encouraging careful reflection on how to respect them and by promoting the development and implementation of sustainability corporate policies (Naciti, 2019). Furthermore, an adequate board of directors can ensure better monitoring of the company's actions, prevent human rights violations and prevent potential violations (McKendall et al., 2019). Against this background, the following hypothesis is formulated:

H1: Board size has a positive impact on the company's respect for human rights.

Another feature much analysed in the literature concerns gender diversity within the board (Frias-Aceituno et al., 2013; Al-Shaer and Zaman, 2016). This diversity concerns the existing differences between men and women from a social and cultural perspective (Liao et al., 2015). Some studies show differences in communication style, personality, skills and work experience, and educational background between men and women (Feingold, 1994; Merchant, 2012). Other studies instead highlight an important difference in values between the two genders. (Hofstede et al., 2010). In general, women are more diligent, committed and dedicated to their work and favour the creation of a good climate within the board (Huse and Solberg, 2006). Women tend to be less focused on personal goals and therefore improve decision-making and increase board effectiveness (Nielsen and Huse, 2010). Glover et al. (2002) argue that women are more inclined to make ethical decisions and pursue socially responsible policies. Gender diversity on the board promotes concern for human rights and the welfare of employees and affected communities. Indeed, women on the board can better understand and represent the concerns of women employees, including those related to workers' rights and equal treatment. Therefore, the following hypothesis is formulated:

H2: Board diversity has a positive impact on the company's respect for human rights.

Generally, the three different approaches most used by companies in the European context to organise the structure of their governance system are "unitary", typically in common law countries, "two-tier", usually in some civil law countries and mixed (Collier and Zaman, 2005). The unitary governance model has a single decision-making structure with the board of directors, while the two-tier model has a separation between the supervisory board and the executive board. The mixed model is a combination of elements of the previous two models and seeks to adapt to the specific needs of the company. The choice between these models depends on local legislation, corporate culture, size as well as the specific needs of the company.

Most research on governance structures shows conflicting results on the effectiveness of dual and non-dual models (Garcia-Ramos and Diaz, 2021; Barrédy, 2023). The effectiveness of each governance model in promoting respect for sustainability, and human rights in particular, depends on how policies and procedures are implemented, how sensitive the leadership is, and how involved board members and staff are.

However, according to agency theory, the introduction of a two-tier board allows for the separation of management and control that a unitary board could not accomplish (Fama and Jensen, 1983; Jensen and Meckling, 1976). Thus, a two-tier system would limit the power of individual board members (Garca-Ramos and Daz, 2021). As Belot et al. (2014) noted, the adoption of a two-tier structure is usually justified by the desire to effectively separate monitoring and management responsibilities. At the same time, the mixed board, which is a combination of elements of the two previous models (unitary and two-tier board), is also intended to ensure greater control activity by adapting to the specific needs of the company. This provides a better balance of power, promotes collegiality among managers, improves transparency and ensures greater sensitivity to the company's various stakeholders. The foregoing suggests this hypothesis:

H3: A two-tier or mixed governance structure has a positive impact on the company's respect for human rights.

Making decisions and plans in board meetings is a crucial way to have influence over a company (Chou et al., 2013). In other words, directors of a company need to be present at board meetings to oversee, regulate and monitor the company or to make strategic decisions for the company. If a director does not regularly attend board meetings, it can be concluded that he or she is unwilling or unable to perform his or her duties. Regular attendance at meetings increases the likelihood that board members will actively engage in conversations about business policies, strategies, and ethical issues (Zaman et al., 2021). In addition, regular attendance ensures that board members are aware of ongoing projects, difficulties, and potential threats to social sustainability (Sekarlangit and Wardhani, 2021). Active participation promotes a sense of responsibility and guarantees that these issues are not ignored. Thus, I posit the following hypothesis:

H4: Attendance of board meetings positive impact on the company's respect for human rights.

Another potentially important feature of corporate governance is the existence of a sustainability committee. According to stakeholder and agency theory, the existence of sustainability committee ensures better control and monitoring of the company's sustainability action and decisions (Baalouch et al., 2019; Giannarakis et al., 2020; Radu and Smaili, 2022). In addition, a CSR or sustainability committee promotes the company's openness to social and environmental issues, as this group is often directly involved in the collection of sustainability data and the preparation of

non-financial reporting (Giannarakis et al., 2020). The sustainability committee reviews the preparation of the sustainability report and the completeness and transparency of the information provided in advance. It also formulates proposals on the company's environmental and social strategy and monitors the implementation of corporate sustainability initiatives as well as social initiatives, including those related to human rights. In light of this, it is possible to formulate the following hypothesis:

H5: The presence of the sustainability committee has a positive effect on the company's respect for human rights.

3. Sample and methodology

This study is based on the European companies that belong to the STOXX 600 index. From the population of 600 companies, those for which the analysed data were not available were excluded. Therefore, the analysis was carried out for 474 companies, using data from the Refinitiv database for the year 2021. To test the formulated hypotheses, the following regression with the Tobit model was applied:

$$HRS_i = \beta_0 + \beta_1 BSIZE_i + \beta_2 BDIV_i + \beta_3 BSTR_i + \beta_4 BMATT_i + \beta_5 SCOMM_i + \beta_6 SOCSC_i + \beta_7 FAGE_i + \varepsilon_i$$

The dependent variable of the model is the Human Rights Score (HRS), which measures a company's effectiveness towards respecting the fundamental human rights conventions. This variable seems sound and appropriate for measuring corporate respect for human rights, considering that the international conventions cover a variety of aspects that relate to the general issue of respect for human rights. The independent variables are instead: Board size (BSIZE), measured by the number of board members that make up the board; Board diversity (BDIV), measured by the percentage of women on the board; Board structure (BSTR), a dummy variable that has a value of 1 if the company has a two-tier or mixed board structure and a value of 0 otherwise (unitary board); Board meeting attendance average (BMATT), measured by the average overall attendance percentage of board meetings; Sustainability committee (SCOMM), a dummy variable that has a value of 1 if the company has a CSR or sustainability committee and a value of 0 otherwise. Finally, to increase the goodness of the regression model, the following control variables are added: Social Score (SOCSC), which is a rounded and comprehensive

score of a company's social performance; Firm age (FAGE), which indicates the age of a company since its inception. These control variables should be positively correlated with the dependent variable. All variables were taken from the Refinitiv database.

The decision to use the Tobit model depended on the following considerations. First, the dependent variable HRS is limited, as its values range from 0 to 100. Secondly, a preliminary descriptive analysis showed that the variables are not normally distributed. Therefore, it was decided to use the Tobit model, which is well suited for cases with non-continuous dependent variables. All variables were standardized by dividing them by the sample standard deviation to avoid biased and inconsistent estimates (Streiner and Norman, 2003).

4. Results and discussion

Table 1 illustrates the descriptive statistics and correlation analysis. Furthermore, the variance inflation factor (VIF) test shows that there is no multicollinearity between the independent variables, as all coefficients are smaller than 1.48 (Myers, 1990). Table 2 shows the results of the regression analysis. The high chi-square value, combined with a p-value that is extremely close to zero, indicates that the overall model has a significant impact on the dependent variable. Furthermore, the low sigma value indicates that the residuals are more concentrated around the regression line, which confirms the goodness of the model. The results show a positive and significant relationship between board structure (BSTR at the 1% level), board meeting attendance average (BMATT, at the 10% level), sustainability committee (SCOMM, at the 5% level) and the dependent variable (HRS) respectively. Therefore, the results confirm hypotheses H3, H4 and H5, while H1 and H2 are not supported. The results suggest that contrary to the hypotheses, both board size (BSIZE) and board diversity (BDIV) do not have a significant impact on the level of corporate human rights compliance. Furthermore, the results show a positive and significant coefficient for all control variables that have a positive and significant association with HRS. This confirms the quality of the analysis carried out.

Two-tier board structures promote independent oversight and greater scrutiny of human rights compliance. Mixed structures also ensure greater attention to and implementation of practises in favour of human rights, seeking to balance oversight and management functions by creating a governance structure that is more in line

with corporate culture and ethical objectives. More frequent participation in board meetings can also have a positive impact on respect for human rights. While respect for rights is highly dependent on the company's culture and values, regular attendance of board members at meetings ensures that they are well informed about ethical issues, more involved in decision-making and more responsible for monitoring activities. Finally, the presence of a CSR officer is a key element in ensuring respect for human rights, as this governance body responsible for monitoring and leading the company's CSR initiatives, which often include social issues related to child labour, diversity, inclusion, and so on.

The empirical evidence confirms what has already been supported in the literature and reported in the section on hypotheses formulation. The non-confirmation of hypotheses H1 and H2, contrary to what could be assumed based on the previous literature, requires further investigation and deeper reflection on the subject. In this regard, it can be noted that while board size can influence various aspects of corporate governance, it does not necessarily have a direct or automatic impact on respect for human rights. As shown earlier in this study, decisions related to human rights can be delegated to specialized commissions or working groups within the company, such as the CSR committee. Furthermore, respect for human rights is highly dependent surely on corporate culture and values. As mentioned above, the presence of women on the board is also not an automatic guarantee of respect for human rights, as change processes are often quite slow and take time. Furthermore, as mentioned above, corporate culture plays an important role in ethical issues related to board characteristics.

Variables	Mean	Med.	Sk.	HRS	BSIZE	BDIV	BSTR	BMATT	SCOMM	SOCSC	FAGE
HRS	-4.42e-016	0.34	-1.23	1							
BSIZE	4.36e-016	0.01	0.66	0.255 ***	1						
BDIV	5.96e-016	0.16	-0.46	0.068	-0.053	1					
BSTR	-4.82e-016	-0.73	0.63	0.041	-0.006	0.105 *	1				
BMATT	-2,48e-014	0.29	-2.42	0.046	-0.102 *	-0.004	-0.069	1			
SCOMM	-1.59e-016	0.40	-2.11	0.394 ***	0.250 ***	0.138 ***	-0.037	-0.080	1		
SOCSC	6.21e-016	0.20	-0.99	0.634 ***	0.356 ***	0.081 *	0.029	-0.065	0.396 ***	1	
FAGE	2.81e-015	-0.37	1.32	0.168 ***	0.073	0.028	-0.085	0.044	0.123 **	0.142 **	1

Notes: Med = Median; Sk. = Skewness; *** = significant at the 1% level; ** = significant at the 5% level; * = significant at the 10% level

Table 1 - Descriptive statistics and correlation matrix.

Variables	Coeff.	Std. Err.	p-value
BSIZE	0.0100	0.0225	0.4483
BDIV	0.0167	0.0227	0.4636
BSTR	0.0557	0.0209	0.0076 ***
BMATT	0.0330	0.0188	0.0797 *
SCOMM	0.0617	0.0280	0.0275 **
SOCSC	0.3595	0.0261	<0.0001 ***
FAGE	0.0518	0.0206	<0.0120 **
Cons	0.2655	0.0256	<0.0001 ***
Number of obs.	474		
Chi-square	333.3650	*p-value*	
		4.47e-68	
sigma	0.4165 (0.0161)		

*** = significant at the 1% level; ** = significant at the 5% level; * = significant at the 10% level

Table 2 - Regression results

5. Conclusions

This study represents a first approach to the analysis of a topic that is still quite unexplored in the literature. The empirical analysis conducted, albeit limited to a single year of observation, shows that respect for human rights in European companies is strongly influenced by the existence of a CSR committee, the type of governance structure and the active presence of board members at meetings. These findings suggest that policymakers could encourage the adoption of two-tier or mixed structures in their governance codes, as well as the establishment of a CSR committee, a measure that is already widely adopted by European companies. On the other hand, companies should raise awareness and consider the benefits of having board members actively participate in meetings and establish a CSR committee.

Future research could overcome some limitations of the present work by including more multinational companies (Ullah et al., 2021), analysing different determinants, broadening the debate between sustainability and human rights (Wettstein et al., 2019) also including through a longitudinal perspective.

References

Al-Shaer, H., Zaman, M.: Board gender diversity and sustainability reporting quality. Journal of Contemporary Accounting & Economics, 12(3), 210-222 (2016).

Arkani, S. Theobald, R.: Corporate involvement in human rights: Is it any of their business? Business Ethics: A European Review, 14(3), 190-205 (2005).

Baalouch, F., Ayadi, S.D., Hussainey, K.: A study of the determinants of environmental disclosure quality: Evidence from French listed companies. Journal of Management and Governance, 23(4), 939-971 (2019).

Barrédy, C.: The paradox between monitoring and entrenchment in a two-tier family business: The contribution of the external commitment theory. Journal of Business Research, 155, 1-16 (2023).

Bathala, C.T., Rao, R.P.: The determinants of board composition: An agency theory perspective. Managerial and decision economics, 16(1), 59-69 (1995).

Belot, F., Ginglinger, E., Slovin, M.B., Sushka, M.E.: Freedom of choice between unitary and two-tier boards: An empirical analysis. Journal of Financial Economics, 112(3), 364–385 (2014).

Buhmann, K., Jonsson, J., Fisker, M.: Do no harm and do more good too: Connecting the SDGs with business and human rights and political CSR theory. Corporate Governance: The International Journal of Business in Society, 19(3), 389-403 (2019).

Butler, S.: H&M factories in Myanmar employed 14-year-old workers. The Guardian, https://www.theguardian.com/business/2016/aug/21/hmfactories-myanmar-employed-14-year-old-workers (2016).

Chamberlain, G.: Disney factory faces probe into sweatshop suicide claims. The Guardian, https://www.theguardian.com/law/2011/aug/27/disneyfactory-sweatshop-suicide-claims (2011).

Cho, C.H., Laine, M., Roberts, R.W., Rodrigue, M.: Organized hypocrisy, organizational façades, and sustainability reporting. Accounting, organizations and society, 40, 78-94 (2015).

Chou, H.I., Chung, H., Yin, X.: Attendance of board meetings and company performance: Evidence from Taiwan. Journal of Banking & Finance, 37(11), 4157-4171 (2013).

Clarke, J.S.: Terry Collingsworth: The globe-trotting human rights lawyer taking on Nestlé and ExxonMobil. The Guardian, https://www.theguardian.com/global-development-professionals-network/2015/sep/02/terry-collingsworth-the-david-taking-on-the-corporate-

goliaths (2015).
Collier, P., Zaman, M.: Convergence in European corporate governance: The audit committee concept. Corporate Governance: An International Review, 13(6), 753-768 (2005).
Elkington, J.: Governance for sustainability. Corporate governance: an international review, 14(6), 522-529 (2006)
Everett, J., Neu, D., Rahaman, A S., Maharaj, G.: Praxis, doxa and research methods: Reconsidering critical accounting. Critical Perspectives on Accounting, 32, 37-44 (2015).
Fama, E.F., Jensen, M.C.: Separation of ownership and control. The Journal of Law and Economics, 26(2), 301-325 (1983)
Feingold, A.: Gender differences in personality: a meta-analysis. Psychological bulletin, 116(3), 429-456 (1994)
Freeman, R.E.: Strategic management: A stakeholder approach. Cambridge university press (2010).
Frías-Aceituno, J.V., Rodriguez-Ariza, L. and Garcia-Sanchez, I.M.: The role of the board in the dissemination of integrated corporate social reporting, Corporate Social Responsibility and Environmental Management, 20(4), 219-233 (2013).
García-Ramos, R., Díaz, B.D.: Board of directors structure and firm financial performance: A qualitative comparative analysis. Long Range Planning, 54(6), 1-17 (2021).
Giannarakis, G., Andronikidis, A., Sariannidis, N.: Determinants of environmental disclosure: Investigating new and conventional corporate governance characteristics. Annals of Operations Research, 294(1), 87–105 (2020).
Giuliani, E., Santangelo, G.D., Wettstein, F.: Human rights and international business research: a call for studying emerging market multinationals, Management and Organization Review, 12(3), 631-637 (2016).
Glover, S.H., Bumpus, M.A., Sharp, G.F., Munchus, G.A.: Gender differences in ethical decision making. Women in Management Review, 17(5), 217-227 (2002).
Gray, R., Gray S.: Accountability and human rights: A tentative exploration and a commentary. Critical Perspectives on Accounting. (2011).
Hidalgo, R.L., García-Meca, E., Martínez, I.: Corporate governance and intellectual capital disclosure. Journal of Business Ethics, 100(3), 483-495 (2011).
Hofstede, G., Hofstede, G.J., Minkov, M.: Cultures and organizations: Software of the mind: Intercultural operation and its importance for survival, McGraw-Hill,

New York, (2010).
Jensen, M.C., Meckling, W.H.: Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of Financial Economics, 3(4), 305-360 (1976).
Liao, L., Luo, L., Tang, Q.: Gender diversity, board independence, environmental committee and greenhouse gas disclosure, The British Accounting Review, 47(4), 409-424 (2015).
Lopatta, K., Tideman, S., Scheil, C., Makarem, N.: The current state of corporate human rights disclosure of the global top 500 business enterprises: Measurement and determinants. Critical Perspectives on Accounting, 1-30, (2022).
Mayer, A.E.: Human rights as a dimension of CSR: The blurred lines between legal and non-legal categories. Journal of Business Ethics, 88, 561-577 (2009).
Matuszak, Ł., Różańska, E.: Towards 2014/95/EU directive compliance: the case of Poland. Sustainability Accounting, Management and Policy Journal, 12(5), 1052-1076 (2021).
Myers, R.H.: Classical and modern regression with applications. Belmont, Duxbury (1990).
McBeth, A., Joseph, S.: Same words, different language: Corporate perceptions of human rights responsibilities. Australian Journal of Human Rights, 11(2), 95-127 (2005).
McPhail, K.., Adams, C.A.: Corporate respect for human rights: meaning, scope, and the shifting order of discourse. Accounting, Auditing & Accountability Journal, 29(4), 650-678 (2016).
McKendall, M., Sánchez, C., Sicilian, P.: Corporate governance and corporate illegality: The effects of board structure on environmental violations. The International Journal of Organizational Analysis, 7(3), 201-223 (2009).
Merchant, K.: How Men And Women Differ: Gender Differences in Communication Styles, Influence Tactics, and Leadership Styles, CMC Senior Theses. Paper 513, http://scholarship.claremont.edu/cmc_theses/513 (2012).
Milne, M.J., Gray, R.: W (h) ither ecology? The triple bottom line, the global reporting initiative, and corporate sustainability reporting. Journal of business ethics, 118, 13-29 (2013).
Morrison, J., Vermijs, D.: The ‘state of play’ of human rights due diligence: Anticipating the next five years. Institute for Human Rights and Business. Institute for Human Rights and Business (IHRB), London (2011).
Muchlinski, P.: Implementing the new UN corporate human rights framework: Implications for corporate law, governance, and regulation. Business Ethics Quar-

terly, 22(1), 145-177 (2012).
Naciti, V.: Corporate governance and board of directors: The effect of a board composition on firm sustainability performance. Journal of Cleaner Production, 237, 1-8 (2019).
Nielsen, S., Huse, M.: The contribution of women on boards of directors: Going beyond the surface. Corporate governance: An international review, 18(2), 136-148 (2010).
Obara, L.J.: 'What does this mean?': How UK companies make sense of human rights. Business and Human Rights Journal, 2(2), 249-273 (2017).
Parsa, S., Roper, I., Muller-Camen, M., Szigetvari, E.: Have labour practices and human rights disclosures enhanced corporate accountability? The case of the GRI framework. Accounting Forum, 42(1), 47-64 (2018).
Perkiss, S., Bernardi, C., Dumay, J., Haslam, J.: A sticky chocolate problem: Impression management and counter accounts in the shaping of corporate image. Critical Perspectives on Accounting, 81, 1-31 (2021).
Preuss, L., Brown, D.: Business policies on human rights: An analysis of their content and prevalence among FTSE 100 firms. Journal of Business Ethics, 109(3), 289–299 (2012).
Radu, C., Smaili, N.: Alignment versus monitoring: An examination of the effect of the CSR committee and CSR-linked executive compensation on CSR performance. Journal of Business Ethics, 180, 145-163 (2022).
Ruggie, J., Des Nations, P.: Guiding principles on business and human rights: Implementing the UN "Protect, Respect and Remedy" Framework. Report of the Special Representative of the Secretary General on the issue of human rights and transnational corporations and other business enterprises (2011).
Schrempf-Stirling, J., Wettstein, F.: Beyond guilty verdicts: Human rights litigation and its impact on corporations' human rights policies. Journal of Business Ethics, 145, 545-562 (2017).
Schrempf-Stirling, J., Van Buren, H.J.: Bringing human rights together with management studies: Themes, opportunities, and challenges. Academy of Management Proceedings, 1, (2017),
Sekarlangit, L.D., Wardhani, R.: The effect of the characteristics and activities of the board of directors on sustainable development goal (SDG) disclosures: Empirical evidence from Southeast Asia. Sustainability, 13(14), 1-17 (2021).
Streiner, D.L., Norman, G.R.: Health measurement scales: A practical guide to their development and use. Oxford University Press, Oxford (2003).
Ullah, S., Adams, K., Adams, D., Attah-Boakye, R.: Multinational corporations

and human rights violations in emerging economies: Does commitment to social and environmental responsibility matter? Journal of Environmental Management (2021).

Vitolla, F., Raimo, N., Rubino, M.: Board characteristics and integrated reporting quality: An agency theory perspective. Corporate Social Responsibility and Environmental Management, 27(2), 1152-1163 (2020).

Whelan, G., Muthuri, J.: Chinese state-owned enterprises and human rights: The importance of national and intra-organizational pressures. Business & Society, 56(5), 738-781 (2017).

Wettstein, F., Giuliani, E., Santangelo, G.D., Sthal, G. K.: International business and human rights: A research agenda. Journal of World Business (2019)

Wettstein, F.: CSR and the debate on business and human rights: Bridging the great divide. Business Ethics Quarterly, 22(4), 739–770, (2012)

Winkler, I.T., Williams, C.: The Sustainable Development Goals and human rights: a critical early review. The international journal of human rights, 21(8), 1023-1028 (2017).

Zaman, R., Farooq, M.B., Khalid, F., Mahmood, Z.: Examining the extent of and determinants for sustainability assurance quality: The role of audit committees. Business Strategy and the Environment, 30(7), 2887-2906 (2021).

Nutrition, Food and Well-Being: an Insight into the Use of Anglicisms in Italian

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Abstract: The issues related to nutrition, food and well-being have been more and more common over the last few years, owing to an increase in the awareness of the importance of leading a healthy life. The emergence of the well-being culture has highlighted that healthy food and sport are pivotal to increase life expectancy, in addition to improving the process of ageing and the quality of life of the elderly (Nisco 2022). Set against this background, this work analyses the use of English terms and expressions in the Italian context, with a particular focus on the domain pertaining to well-being and nutrition. The paper examines a collection of Italian texts, with the purpose of highlighting the influence that the English-speaking world has exerted over the Italian language and culture (Zoppetti 2023). The collection of texts includes workout plans and specific articles about health and fitness. The paper dwells on the most popular expressions, collocations and terms used in the world of fitness and nutrition in order to investigate the influence of English on the Italian vocabulary related to well-being. The NOW corpus (News on the Web) and the ItTenTen20 corpus are employed in this study to investigate the current use of the expressions related to nutrition, food, and well-being in English and in Italian. Finally, the work discusses the threat of the anglicization process which may lead to the lexical impoverishment of the Italian language (Pulcini 2023; Zoppetti, Testa 2017; Zoppetti 2023).

Keywords: Anglicisms, food, nutrition, well-being.

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1. The use of Anglicisms in Italian: the contemporary context

The use of Anglicisms, or English words and phrases, has been more and more common over the last few years, not only in specific domains like technology, business and politics, but also in different everyday situations (Zoppetti, Testa 2017). It is a fact that nowadays even people with a limited knowledge of English employ Anglicisms, particularly when they refer to shopping matters and other everyday circumstances, ranging from banking to home appliances. Despite the ongoing economic and political development of many Asian and South American countries, the two leading English-speaking countries (the U.S.A. and the U.K.) are still dominating the geopolitical scene and, as a result, their language, English, is used as a Lingua Franca not only in the European Union, but also all over the world. The present paper aims to focus on the use of Anglicisms in the world of nutrition, food, and well-being in the Italian context. Numerous scholars have analysed the interference of English in modern Italian, like Gualdo (2009), Pulcini (2023), Zoppetti and Testa (2017), Zoppetti (2023) to name but a few, but the use of English terms and definitions in fitness and well-being in the Italian context deserve further investigation, given the importance that fitness and well-being have today in people's lives.

To begin with, the history of the use of Anglicisms in Italian is marked by different geopolitical and historical factors (Marazzini, Petralli 2015), which will not be discussed in this work. Suffice it to say that the intense inflow of Anglicisms and English borrowings into Italian surged after the Second World War, when the Anglophone winners started to exert a strong political, economic and cultural influence on Western Europe (Furiassi, Pulcini and Rodríguez González 2012; Pulcini 2017). Italian has turned out to be one of the most receptive languages to English, owing to historical and cultural reasons (Pulcini 2023). Set against this background, the current work means to analyse the use of English in the Italian context, regarding two specific domains: nutrition and well-being.

2. The use of English in specific domains: nutrition, food and well-being

The world of fitness has changed the modern way of life in Italy. Studies on the effects of food,

nutrition and physical exercise on human health have drawn people's attention to

the importance of

healthy food and sport. Sport culture and physical exercises are vital to lead a healthy life and to extend life expectancy (Nisco 2022). The wellness culture has been prominent among new and older generations; fitness and healthy food are now considered as important as other aspects of people's lifestyles. Because of the importance that fitness and healthy food have had over the last few years, a considerable number of English words have become of common use in sportspeople's language. Apart from the numerous English borrowings used in different sports, from soccer to tennis, English words and collocations are more and more frequent among fitness instructors and people who go to gyms. Workout plans, prepared by fitness instructors, contain the exercises that sportspeople must do to keep fit. Most of the names of the exercises in workout plans are in English. The words pertaining to fitness that are listed in this work refer to exercises involving different parts of the body. Such words were collected from some workout plans prepared by the fitness instructors of some popular gyms located in Southern Italy[1]. The following list shows the names of some common physical exercises. The latter are linked to the parts of the body (in bold) that they strengthen:

Chest: chest press, crossover, pec deck, pectoral machine, push up.
Back: body row, dead row, lat machine, pulley, pullover, rowing machine.
Biceps: curl, hammer curl, spider curl.
Triceps: dips, kick back, push down.
Shoulders: clean & press, military press, shoulder press.
Legs: back squat, deadlift, frontal squat, leg curling, leg extension, leg press, squat, overhead squat.
Abdomen: crunch, hover, plank, reverse crunch, sit up.

Table 1. Words and collocations listed in some workout plans.

The exercises in the list above are indicated by means of single words and pair-words, which often sound like collocations, as they involve "various kinds of composite units and 'pre-patterned' expressions" (Altenberg 2001, 101). The vocabulary used in workout plans often includes single words and collocations. Such words and collocations consist of different parts of speech, as is shown table 2:

[1] The workout plans are not quoted in the reference list, since they are not official documents. However, they are authentic materials that were consulted to collect the English words and expressions used in workout sessions.

verb + preposition (phrasal verb): crossover, kick back, pullover, push down, push up, sit up ("crossover" and "pullover" result from the union of the verb and the preposition which lead to a one-word expression).
noun + noun: chest press, body row, hammer curl, leg curling, leg extension, leg press, pec(toralis) deck, rowing machine, shoulder press, spider curl.
adjective + noun: deadlift (compound), dead row, frontal squat, lat(issimus dorsi) machine, military press, pectoral machine, reverse crunch.
verb + verb: clean & press (binomial collocation).

Table 2. Parts of speech (in bold) pertaining to words and collocations used in some workout plans.

Some collocations are formed by Latin words, like "lat machine" and "pec deck"; the former, "lat", stands for "latissimus ("the broadest", hence "latissimus dorsi", a large and flat muscle on the back), the latter, "pec", stands for "pectoralis" ("chest"). As is known, many sports and physical exercises come from the Anglophone world and, consequently, the vocabulary that pertains to specific exercises or sports has been directly imported into different languages. As for Italian, many terms and expressions used in sports and workout plans are English borrowings. The latter are used for marketing goals and in advertising, in that they aim to increase people's wish to keep fit and feel young; as Pulcini (2023, 130) claims, Anglicisms sound "better, younger, more modern, professional, international, attractive and successful than the Italian equivalent". The English loanwords used in workout plans often lack an Italian equivalent and have been directly adopted in Italian for business purposes.

Other examples of Anglicisms are from Men's Health, one of the most popular magazines among sportsmen, as it deals with fitness, nutrition, and health. It would be impossible to dwell on the various issues of this magazine, owing to lack of space; a thorough analysis of the issues of the magazine could be carried out in a longer paper. This work dwells on the latest issues of Men's Health, to pinpoint the use of Anglicisms in the world of fitness and well-being. The issue of February-March 2023 (number 238, page 4)[2], as well as all the issues of the magazine, presents English words in the index: "MH world", "MH body", "MH life", "MH mind", "MH plus" ("MH" stands for Men's Health). The index itself discloses the main topics that the magazine covers, which range from physical exercises to mind wellness. Most of the pages of the issue are devoted to physical exercises, and they offer various tips on how to avoid mental and emotional stress. English words abound throughout the magazine, and the titles of some articles in the magazine are

[2] Hereafter, the page numbers of the magazine Men's Health are in parenthesis.

often written in English, like "Elevate your wellness" (44), "Pump, push & power" (46) and "Core attack" (48). Some workout expressions even combine English and Italian words, like "Weight e power lifting" (46), in which the use of the Italian conjunction aims, in this case, to highlight the trainer's (Giacomo Spazzini) favourite exercises: "Weight e power lifting sono il primo amore di Giacomo Spazzini" ("Weight and power lifting are Giacomo Spazzini's first love", my translation, 46). Some pages contain workout plans, which include the following exercises: "push up", "air squat", "dead hang", "plank", "jumping lunge", "kettlebell American swing", "butterfly sit up", "complex hang power clean", "dumbbell press", "toes to bar", "kettlebell sumo deadlift", "high pull" (47). The issue of April-May 2023 (number 239) presents other no less interesting English expressions, like "strict pull up", "burpees touch", "kettlebell goblet squat" (56). In addition to such expressions, the same issue contains an article that suggests new ways to regenerate sportspeople's minds, like the so-called "sleep tourism" and the "sleepcation" (70), whose purpose is to boost people's rest and relaxation on holiday.

From fitness and wellness, the "Morbus Anglicus" (Castellani 1987) has been invading the Italian vocabulary related to food and cuisine as well. In particular, the relationship between food and translation has not been widely investigated since, as Chiaro and Rossato (2015, 237) claim, "despite a rapidly expanding market for translation of food-related texts, the relationship between food, culture and translation remains under-researched". At the same time, people have been more and more interested in food and gastronomy (Chiaro and Rossato 2015), and food-related vocabulary is now characterised by many English words and expressions, whose cross-cultural and cross-linguistic meanings have drawn scholars' attention (Graziano 2017). Despite the use of French terms in Italian cuisine (Frosini 2009), the English lexical invasion stands out when we refer to the processes of food production, some specific culinary practises or particular gastronomic events. French words in Italian gastronomy are still frequent and often refer to food that is cooked in fancy restaurants. However, several English terms have been employed over the last few years to refer to special events or new dishes. The so-called "All you can eat" (Mirandola 2019)[3] formula, for example, which sounds like a phraseological unit, has become popular, and many restaurants have been experiencing it. It means that customers can eat what they wish in a restaurant by paying a fixed price. The "All you can eat" formula allows customers to dine in a restaurant at an affordable price. The "brunch" was introduced at the beginning of the new millennium and

[3] Hereafter, all references to English food-related words are from Mirandola's article.

has been known in Italy for some years by now, mainly by the young, while the "street food" (food that people can buy and eat outdoors) is often related to special gastronomical events and festivals. The latter are very popular in Italian rustic areas, even though "street food" festivals are held in cities too. Other examples of collocations and compounds that refer to food are "coffee break", "finger food", "food festival", "happy hour", "homemade", "junk food", "made in Italy" (referring to any product, included food, that was produced in Italy), "milkshake", "pancake", "takeaway", "wine bar", and the list could continue. As to the processes of food production, recurrent collocational expressions are "fast food", "slow food", "agri-food", "supply chain" (Fiore, Alaimo and Chkhartishvil 2020). The terms that have been listed above are examples of direct borrowings, namely words that have been imported into the receiving language, Italian, without any changes or adaptations. As Pulcini (2023, 57) writes, "a direct borrowing […] is indeed 'a characteristically English word, phrase or idiom', taken in its English form or with minor integration into the structures of the recipient language, leaving it as 'recognizably English'".
It would be interesting to investigate the use and the occurrences of all the above-mentioned English borrowings in Italian, but this analysis could be carried out in a longer paper. In addition to discussing the use of Anglicisms in the world of fitness and nutrition in the Italian context, it is worth shedding light on the occurrences of some of the most common workout and food-related expressions used in contemporary English, on a global scale, and in Italian. For this purpose, the English corpus, the NOW corpus (News on the Web), and the Italian corpus, the ItTenTen20 corpus, have been consulted. Table 3 shows a comparative overview of the occurrences of some workout and food-related words and expressions in English and Italian that have been previously quoted[4].

[4] For further information about the ItTenTen corpus, see Furiassi 2017.

Words	Occurrences in the NOW corpus	Occurrences in the ItTenTen20 corpus
agrifood	2,529	4,822
burpees	2497	570
coffee break	2,444	8,665
crunch	124,499	10,830
curl	28,702	6,940
dips	42,695	531
fast food	63,576	25,956
food festival	11,286	2,781
happy hour	14,917	12,206
kick back	7,718	73
pancake	22,489	11,973
plank	34,376	6,896
pulley	4,497	1,001
push up	21,013	3,459
slow food	3,507	52,549
squat	22,221	21,954
street food	26,140	26,484
wine bar	11,518	8,615

Table 3. Occurrences of some common workout and food-related words and expressions in the NOW corpus and in the ItTenTen20 corpus.

Some words in table 3, like "crunch" and "curl", are used in different contexts and, as a result, their occurrences in the two corpora do not only account for sport, but also for other fields. Moreover, the Italian corpus shows that the above-mentioned words have fully entered the Italian vocabulary and are now used by Italians. It is necessary to bear in mind that the NOW corpus and the ItTenTen20 corpus differ in the time range, as the former includes the English vocabulary used on a global scale from 2010 to the present, while the latter includes data that were downloaded between 2019 and 2020[5].

3. The English lexical invasion. What consequences for the Italian vocabulary?

Scholars have been questioning the ceaseless introduction of new Anglicisms into Italian, and the possible consequences that the so-called English lexical invasion can exert on Italian (Pulcini 2023). The Italian dictionary Devoto-Oli registers

[5] The NOW corpus was last updated on 18 August 2023 (https://www.english-corpora.org/now/).

4.000 English words (Devoto-Oli 2022), and such a figure is expected to increase. Italians are adopting and accepting the English borrowings to keep up with trends and with the changes of the globalised world. The adoption of adapted and non-adapted Anglicisms has been considered from different angles by scholars. According to Zoppetti and Testa (2017), if the inflow of Anglicisms continues, the Italian language will not be able to convey the meanings of the new words and expressions that are coined by the technologies and innovations of the third millennium. In other words, Italian will be relegated to the role of classical languages, as it will lack the vocabulary that twenty-first century Italians will have to use to refer to the innovations and to the changes brought about by human progress. In light of this, Zoppetti (2023) suggests a transition towards linguistic ecology, a concept that aims to protect less-spoken languages such as Italian, so that these languages can conform to linguistic changes by means of their own lexical resources. The concept of linguistic ecology compares languages to living beings. From the perspective of linguistic ecology, it would be wrong to believe that the extinction of certain species is part of a natural process. If this happens, we should protect the species in danger of extinction, instead of taking it for granted that their extinction is a normal process, since biodiversity is important to natural balance and ecosystem (Zoppetti 2023). Likewise, the Italian language should preserve its historical and cultural role in the European plurilingual context. The languages of the European Union that, like Italian, are being dominated by English, should be able to preserve their history and to adapt themselves, in Darwinian terms, to the linguistic and lexical changes by means of their own lexicon. Following some scholars' Anglophobic concerns (Castellani 1987; Zoppetti 2023), the purpose of linguistic ecology is thus to filter the inflow of English borrowings in Italian and to elicit new endogenous terms and expressions able to render the meanings of such borrowings.

On the other hand, other scholars (Beccaria 2002) look at the introduction of foreignisms as a sign of linguistic innovation and enrichment. This view thus supports the democratic attitude of the Italian language which, unlike French, German and Spanish, welcomes the exogenous influences of English with enthusiasm, as English conveys "modernity, trendiness, professionalism, innovation, leadership, and success" (Pulcini 2023, 225). The debate about the use of Anglicisms in Italian has been going on for decades and will certainly continue in the future. The pro- and anti- Anglophone tendencies in Italy have been influenced by political, commercial, and historical factors over the years. However, it cannot be denied that English is considered the most important foreign language in Italy. Educational institutions, from schools to universities, have boosted English courses and increased English

teaching hours. Although the Italian Parliament has recently proposed a bill that prohibits the use of Anglicisms in Italian documents (Atti Parlamentari 2022; Carbonaro 2023), English is seen as an essential resource in Italy for the workplace.

Overall, some scholars (Pulcini 2023) claim that the number of Anglicisms in Italian is not high enough to threaten the existence of the language. At the same time, sport, fitness, and nutrition include a remarkable number of English words and expressions that are currently used in everyday situations. A more detailed analysis on the issue could be carried out in a longer paper, as the present work is the initial step of a larger project, whose purpose is to investigate the use of Anglicisms in other lexical areas of the Italian language, by employing the English and the Italian corpora.

References

Altenberg, B.: On the Phraseology of Spoken English: The Evidence of Recurrent Word-
Combinations. In: Cowie, A. P. (ed.) Phraseology. Theory, Analysis, and Applications, pp. 101-22. OUP, New York (2001).

Beccaria, G., L.: Italiano antico e Italiano nuovo. Garzanti, Milano (2002).

Castellani, A.: Morbus Anglicus. SLI 13,1, 137–57 (1987).

Chiaro D., Rossato, L.: Food and Translation, Translation and Food. The Translator 21, 3, 237-43
(2015).

Devoto, G., Oli, G., C., Serianni, L., Trifone, M.: Nuovo Devoto-Oli. Il vocabolario dell'italiano
contemporaneo. Le Monnier, Firenze (2022).

Fiore, M., Alaimo, L. S., & Chkhartishvil, N.: The amazing bond among wine consumption,
health and hedonistic well-being. Br Food J 122, 8, 2707-23 (2020).

Frosini, G.: L'italiano in tavola. In: Trifone, P. (a cura di) Lingua e identità. Una storia sociale
dell'italiano, pp. 79-103. Carocci, Roma (2009).

Furiassi, C., Pulcini V. & Rodríguez González, F. (eds): The Anglicization
of European Lexis. John Benjamins Publishing, Amsterdam/Philadelphia (2012).

Furiassi, C.: Pragmatic borrowing: phraseological anglicisms in Italy. In: Boggio,

C., Molino, A.
(eds) English in Italy. Linguistic, Educational and Professional Challenges, pp. 38-60. FrancoAngeli, Milano (2017).
Graziano, A.: Marketing food through translation: an analysis of a hundred menus from Lazio. ESP
Across Cult 14, 99-114 (2017).
Gualdo, R.: Linguaggi specialistici. In: A.A.V.V. (a cura di) XXI secolo. Vol 2. Comunicare e
rappresentare, pp. 395-405. Istituto della Enciclopedia Italiana fondata da G. Treccani, Roma (2009).
Marazzini, C., Petralli, A. (a cura di): La lingua italiana e le lingue romanze di fronte agli
anglicismi. goWare, Firenze (2015).
Men's Health, 238, February-March (2023).
Men's Health, 239, April-May (2023).
Nisco, M. C.: The English training lab. Sports and health in ESP contexts. Idelson-Gnocchi, Napoli (2022).
Pulcini, V.: Anglicisms in Italian: moving on into the third millennium. In: Boggio, C., Molino, A.
(eds) English in Italy. Linguistic, Educational and Professional Challenges, pp. 15-37. FrancoAngeli, Milano (2017).
Pulcini, V.: The Influence of English on Italian: Lexical and Cultural Features. Mouton de
Gruyter, Berlino (2023).
Zoppetti, A, Testa A. (pref.): Diciamolo in italiano. Gli abusi dell'inglese nel lessico dell'Italia
e incolla. Hoepli, Milano (2017).
Zoppetti, A.: Lo tsunami degli anglicismi. Gli effetti collaterali della globalizzazione
linguistica. goWare, Firenze (2023).

Online sources

Atti Parlamentari. Camera dei Deputati. Proposta di Legge (2022). At
http://documenti.camera.it/leg19/pdl/pdf/leg.19.pdl.camera.734.19PDL0017640.pdf (last accessed 16 August 2023).
Carbonaro, G.: Ciao, non hello! Il governo italiano vuole vietare le parole inglesi

con multe fino a
100mila euro (2023). At https://it.euronews.com/2023/04/04/ciao-non-hello-il-governo-italiano-vuole-vietare-le-parole-inglesi-con-multe-fino-a-100mil (last accessed 11 August 2023).
Mirandola, R.: Lo strano fenomeno della cucina itanglese (2019). At https://www.radio-food.it/lo-
strano-fenomeno-della-cucina-itanglese/ (last accessed 10 August 2023).
NOW Corpus (News on the Web). At: https://www.english-corpora.org/now/ (last accessed 13
August 2023).
Sketch Engine. At https://www.sketchengine.eu/ (last accessed 12 August 2023).

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