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Education first: What really matters in working for sustainability

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ABSTRACT

In a world characterized by rising inequalities, the research explores the connections among macro, meso and micro systems to explain how the goals of global, organizational and individual sustainability could be effectively achieved. While much of recent research has focused on impact of technological progress and globalization on increased inequalities, few studies have systematically investigated complementary and convergent measures to achieve equality and sustainability. To dismantle common misconceptions and concerns, embedded in fragmented and linear ways of seeing complex phenomena, a conceptual paper is developed. By assuming a systemic and multilevel approach, the research illustrates how technological progress, globalization, economic growth and social equity could be reconciled. Without a systemic orientation, the real causes and solutions to inequality problems are not recognized. When a systemic approach is used, technological progress appears as a driver for equality solutions rather than a source of inequality, while education becomes the best antidote to unemployment.

1. Introduction

In the global economy, the rethinking of the labour market is made inevitable by a sharp acceleration of productivity, which seems to accentuate the phenomena of social inequality by sacrificing the employment of people. Increases in productivity of most industries have their source in a faster pace of innovation. Already a quarter of a century ago, Rifkin (1995) announced the end of work, because labour-saving technologies would have eliminated many jobs in the agricultural, manufacturing, and service sectors. More recently, the labour-saving innovation has been perspicaciously phrased "a euphemism under current circumstances for creating unemployment" (Stiglitz, 2012, p. 283).

Current circumstances are exacerbated by uncertainty that seems to be another distinct feature of society. Uncertainty means that something, like future, cannot be foreseen, calculated or controlled (Nowotny, Scott, & Gibbons, 2001). The corollary of this uncertainty is twofold: first, even it cannot be eliminated, uncertainty can be reduced by additional information, knowledge, and education; second, even it cannot be predicted, the future can be imagined, influenced, shaped and created by people who are sufficiently aware of one another's perspectives, aspirations and motivations to be able to work together as a collective. The assumption here is not simply that a successful collective is "more intelligent than the smartest of its members, but that it presents occasions for all participants to be smarter – that is, to be capable of actions, interpretations, and conclusions that none would achieve on their own" (Davis & Sumara, 2009, p. 38).

The present research argues that education offers ways to achieve sustainable changes in well-being at different levels, with the consequence that education should become the main focus of redistributive policy to reverse inequality. Education is the most important driving force for sustainable changes, and it may allay many fears and prejudices regarding the impact of new technology (Rotmans, Kemp, & Van Asselt, 2001). Education is intended here as *lifetime* education, "consisting of a formal part ('schools') and an

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informal part ('jobs and elsewhere')" (Stiglitz & Greenwald, 2015, p. 54). Although education and learning are inextricably connected or used in interchangeable ways, the first term should be preferred (Barrow & Keeney, 2001), because it has a wider meaning, embracing any process aimed to help others to learn. "Education must always include learning but not all learning is education … Education is assisted and purposeful learning, but there is also learning which is not educational" (Rogers, 2003, p. 4).

As extensively argued by Pipere, Veisson, and Salīte (2015), studies on education for sustainable development (ESD) are affected by a heterogeneity of approach. The lack of consensus about what constitutes ESD can be explained by the complex and constantly evolving nature of sustainable development (Reunamo & Pipere, 2011). Most studies share however the common assumption that ESD should enhance the capacity of individuals and organizations to learn so that they can influence systems and participate in decision-making processes (Landorf, Doscher, & Rocco, 2008; Reunamo & Pipere, 2011; Sund & Lysgaard, 2013). Education "about learning for change and about learning to change … will help us to learn to live together sustainably" (Matsuura, 2009, p. 13).

There is a growing global consensus that the goal of *education for all* plays a critical role in sustainable development, because everyone should have the right to learn in order to contribute to the design and development of a better and safer world (Matsuura, 2009). A resolute social policy to correct an unfair distribution of education is the fundamental pre-condition to alleviate inequalities among individuals and groups (Faure et al., 1972). The underinvestment in education sounds paradoxical, if not contradictory, especially at a time when much of the debate revolves around the *knowledge economy*, *learning economy*, *innovation economy*, *open society*, *information society*, *knowledge society*, *learning society*, *smart society*. Co-learning and co-production of knowledge, where people are empowered to consume and produce knowledge, should be the most appropriate means to desired ends in modern societies.

Moving the focus from likely futures, based on historical trends, to desirable futures, the paper uses a backcasting approach, by thinking about a participatory scenario that embraces sustainable goals (Höijer, Lidskog, & Uggla, 2006). A backcasting approach focuses upon feasibility and choice rather than prediction and likelihood, and it is typically "applied on long-term complex issues, involving many aspects of society as well as technological innovations and change" (Dreborg, 1996, p. 814). Backcasting is a term introduced by Robinson (1988) to denote that the future is not already predetermined but it remains to be created, with the consequence that the search for the most likely future, which may not be the most desirable, should be replaced by the formulation of alternative feasible and desirable futures. Unlike conventional predictive forecasting analyses, backcasting analyses "do not show what will happen but what might happen, given certain conditions and choices" (Robinson, 1988, p. 335). Backcasting is a fruitful approach for broadening the scope of solutions to complex long-term sustainability problems that, requiring more than marginal changes at many levels of society, should be addressed by widening the perspective of many actors, including public authorities, private enterprises, citizens. Without refusing its dependence on values/interests, backcasting is characterised by a multidisciplinary perspective due to the belief "that the intentions of many actors – not only a few decision makers – are essential for the long-term development of society, and that these intentions can be influenced by new knowledge and novel concepts" (Dreborg, 1996, p. 824).

In particular, the main research question is how to pursue technological progress without sacrificing the employability of people and the principle of equality. To answer this question, a conceptual paper is developed (Gephart, 2004; Glaser & Strauss, 1967; Maxwell, 2013; Miles & Huberman, 1994), by using an integrated, systemic and multilevel framework. Especially in a global economy, where all the variables are deeply interconnected, comprehensive measures and actions at various levels are required for achieving sustainable development, intended as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, p. 8).

Given the intergenerational nature of sustainable development, a whole pattern shift would take place over a time span of at least two generations, requiring a period from 25 to 50 years before having social dynamics that shape public policy, economic activity and technological progress (Martens, 2006). As discussed further below, technological progress has pros and cons, but the debate between technological optimists and techno-critics may divert attention away from the primary objective of choosing those activities that support a sustainable society. This primary objective can be achieved by providing different actors in society with a better foundation of knowledge for discussing goals and taking decisions (Dreborg, 1996).

It seems clear that the central reason for continuing education is the premise for a participatory experience in the economic, political and social life of communities. Hence, the research focuses on elements that were found particularly useful and crucial for understanding how to conciliate societal and human needs, public policies and collective actions toward the achievement of sustainable development goals. For the investigation of sustainability issues, "gaining insight into the linkages between events on both the macro and the micro scale is one of the major challenges facing sustainability" (Martens, 2006, p. 39), because environment, economy, society, politics, education and other dimensions are all interrelated and no one of them can be sustainable in itself (Cilliers & Nicolescu, 2012).

The reminder of the paper is structured as follows. At first, the impact of technological changes on labour force is explored, by highlighting the crucial question of inequalities within the context of globalization. Then, the research presents the main discussion and it encompasses the required interventions on the macro (governments), meso (organizations) and micro (individuals) levels to overcome the structural causes of inequality and job shortage. To achieve common and interdependent goals, the paper proposes a new solution by which institutions and firms can preserve the labour power of current and future generations, and it suggests how individuals can preserve their labour power. The final section presents concluding remarks.

2. Technologies, globalization and inequalities

The current era is affected by some structural trends such as the accelerated pace of technological progress, globalization, and the growing inequality. All these phenomena are reciprocally linked, influencing each other. For this reason, they should be analysed together to identify a comprehensive framework of intertwined and complementary measures that should be adopted in order to face

the main social and economic issues.

In the global economy, a digital transition is in progress and the way goods are manufactured in developed countries is dramatically changing, due to several disruptive technologies, including the Internet of Things, advanced robotics, additive manufacturing, Big Data analytics, artificial intelligence (Manyika et al., 2013). This transition is also known as Industry 4.0, which is a specific term used to indicate the fourth industrial revolution. This revolution is based on combinations of technologies, hyperconnectivity and data analysis, which allow the absolute customization of products, the integration of value chains and greater efficiency (Schwab, 2017).

Technological advances, particularly in computerization, encourage firms to robotize, replacing unskilled jobs that can be easily routinized by machines. It is a common view that new disruptive technologies will burn more jobs than those the same technology will be able to generate in several industries (Kotler, 2015). According to Frey and Osborne (2017), 47 % of total US employment is in the high-risk category, being these jobs expected to be automated relatively soon, perhaps by 2023 or 2033. Based on their estimates, the probability of computerization involves 702 occupations and it affects workers across a wide range of industries.

Ongoing technological progress is driven by complex demand- and supply-side factors, and technology is often seen as a source of strategic advantage, wealth creation, improved health and quality of life (Rip & Kemp, 1998). “Countries that perform well economically are more likely to be consumers of the most advanced scientific knowledge. Conversely, the inability to participate in knowledge consumption leaves many regions and countries locked out of the economic action” (Gibbons, 1998, p. 21). The benefits of technological progress for society are multiform.

First, it is unquestionable that there are fields, such as the medical domain, where computerized tasks prove to be more effective and efficient than those performed by human beings, with significant benefits in terms of healthcare quality (Christensen, Bohmer, & Kenagy, 2000). Second, technological development frees workers from alienating or dangerous jobs, and it improves the efficiency of production, with consequent decrease in selling prices. The replacement of routine occupations by automation is a good thing, because routine tasks tend to be humdrum tasks, often associated with low levels of job satisfaction and with job depression (Grau, Salanova, & Peiró, 2001; Latham & Pinder, 2005; Spector, 1997). Third, new technologies can provide governments with the knowledge to deliver better services to increasingly demanding citizens. Undoubtedly, information and communication technology (ICT) tools and applications increase government transparency and accountability in public administration, by creating new public value for citizens and businesses (Al-Hujran, Al-Debei, Chatfield, & Migdadi, 2015). Moreover, smart technologies have the merit of simplifying daily life and reducing environmental damages. The house is the most advanced frontier of the Internet of Things, where it is possible to have information to save energy and resources (Kopetz, 2011). Technologies of new generation, such as clean and eco-efficient technologies, hold a pivotal place in solving environmental problems (Heaton & Banks, 1997).

Furthermore, new media, including the Internet and its evolution, enable people to access information and knowledge (Manyika et al., 2013). A relevant step in this direction is the supply of massive online open courses (MOOCs) provided by universities as an alternative to traditional classrooms. Beyond the thoughts of doomsayers, who predict the end of liberal learning and a generation unable to communicate in face-to-face, it is easy to agree with those who optimistically see the emergence of MOOCs as a tool for expanding knowledge access to previously disenfranchised groups of students, for developing new methods of pedagogy for deeper and more sustained learning, for building global communities focused on education (Breslow et al., 2013). But even more interestingly, technological progress makes investment in education more rewarding. As shown by the models presented by Nelson and Phelps (1966), “the rate of return to education is greater the more technologically progressive is the economy… In particular, it may be that society should build more human capital relative to tangible capital the more dynamic is the technology” (p. 75).

Besides, technological progress facilitates globalization, which makes the world more interconnected and interdependent than even before. The multiplicity of linkages and interconnections lies at the heart of globalization, which refers to “the process by which events, decisions, and activities in one part of the world come to have significant consequences for individuals and communities in quite distant parts of the globe” (McGrew, 1992, p. 23). Globalization creates both more hazards and more opportunities for everyone: hazards arise from a more volatile environment and more competition; opportunities arise from more numerous and larger markets. Globalization means that companies can move production to countries where resources are less expensive. Globalization also means that workers can seek employment in different parts of the world, especially in a virtual way. By breaking the physical barriers, modern digital technologies have also made workers more connected and global. Nowadays, people can work without being physically at the company; they can work staying at home wired in on the Internet and embracing the lifestyle of the *digital nomad* (Makimoto & Manners, 1997).

Empirical studies have identified technological progress and globalization as factors driving the recent increase in inequality in most countries, even though the adverse impact of globalization on income inequality is smaller than that of technological progress (Hijzen, 2007; Jaumotte, Lall, & Papageorgiou, 2013). However, it is noteworthy that inequality is not one thing but many things: *inequalities* (Rae, 1981). Indeed, there are different notions of inequality undermining growth prospects in the long term: *income inequality* and *non-income inequality*.

Income inequality depends on both income from work and income from capital (relative to dividends, interest and capital gains). *Income inequality* is often the result of *non-income inequality*, intended as “inequality in the distribution of substantive freedoms and capabilities” (Sen, 2001, p. 119). Specifically, the rising of *income inequality* is strictly linked to greater differences in educational opportunities and health outcomes. People with unprosperous socio-economic status experience a lack of health care, poor educational opportunities, low skills and, hence, limited employment prospects. Because of the inequality of opportunity, people born at the bottom of social pyramid are likely to end up there. Educational inequality perpetuates a vicious circle of exclusion. Making knowledge less accessible hinders equality, impairs development and increases poverty. *Income inequality* is not the problem but the problem symptom. Any solution that addresses only the symptoms of a problem, not fundamental causes, tends to have short term

benefits at best, but the problem resurfaces and worsens in the long term (Senge, 1999).

Income inequality reflects and reinforces the unequal distribution of power and information. The *digital inequality* seems to be a new form of inequality, based on the increasing power of a few global firms in collecting information. Apple, Google, Microsoft, Amazon and Facebook are the five largest companies in the world in terms of market capitalization (Taplin, 2017). Their competitive advantage is based not much on goods or services they produce or distribute, but on the massive amount of information and digital archives they own and resell to other businesses or governments. Having Big Data on consumers' patterns means having more chances to build algorithms with a higher predictive value.

Finally, it is worth noting that inequalities arise also from unfair goals and misguided measurements of growth. "Economic theory cannot be limited to the study of the *means* of economic development, it must also contemplate the problem of defining the *goals*" (Screpanti & Zamagni, 2005, p. 413). Metrics influence the decisions of policy-makers, who should select them carefully. Those who use the wrong metrics strive for the wrong things. When the major metric, such as the Gross Domestic Product (GDP), does not capture inequalities, it is hard to plan and implement policies and actions to correct/prevent the adverse effects of unsustainable development. The use of right metrics is a crucial aspect to avoid a misallocation of resources and to pursue social and developmental goals, such as the growth of employment rate, the increased access to education, the reduction in poverty and inequality, and the protection of the environment. "More generally, what matters is not GDP, but the quality of life, 'well-being' and the enhancement of individual and societal capabilities" (Greenwald & Stiglitz, 2013, p. 39).

Actually, the issue is not globalization, which leads to a higher international diffusion of knowledge and research, but the democratic deficit in the way globalization is managed because of the weakness of legal and formal institutions. The problem is not a lack of wealth, but rather the growing concentration of wealth in few hands and the growing impoverishment of many. The latter people are demanded to consume but they are not allowed to produce. However, this demand has a logic fault, as persons without any source of income are not in a position to consume. Thus, the fate of few giants, in particular, and the fate of economic development, in general, are at risk if there are few consumers. To be profitable, industrialization requires "the distribution of income, since the middle class are the natural consumers of manufactured goods" (Murphy, Shleifer, & Vishny, 1989, p. 538). Especially in the global economy, competition pushes firms to pursue technological innovations to increase productivity and to reduce costs. When labour productivity increases, the number of workers required to produce goods and services decreases, and thus unemployment increases. If unemployment increases, on average, the household income decreases and consumption expenditure declines. But if the demand for goods and services decreases, the production itself is at risk.

This so-called *impossible growth dilemma* (Kotler, 2015) is also the *golden rule* of economic growth. In the long run, either the *growth* is *sustainable* and *fair*, or it is *not* a *growth*. In other words, economic growth fortunately has intrinsic antibodies that prevent its misuse. There is no stable growth without equality, since an unequal economic growth market is against nature, being fated to harm itself. There is an extensive empirical literature reporting a negative effect of inequality on growth (e.g., Aghion, Caroli, & Garcia-Penalosa, 1999; Alesina & Rodrik, 1994; Benabou, 1997; Birdsall & Londoño, 1997; Clarke, 1995; Perotti, 1996; Persson & Tabellini, 1994). All systems, "from ecosystems to animals to organizations, have intrinsically optimal rates of growth. The optimal rate is far less than the fastest possible growth" (Senge, 1999, p. 62).

It is only a coincidence, but it is an eloquent coincidence, that the term *equity*, which is closely related to the capital contributed by shareholders, means "the value of a company's shares" but the same word *equity* can also signify "a situation in which everyone is treated equally," as explained by the Oxford Advanced Learner's Dictionary (2015, p. 518). Someone fears that capitalism is killing democracy (Reich, 2007). Really, to work in the long term, the capitalism needs democracy and affluent middle class, and so the opposite can be asserted: the oligarchy kills the capitalism and the free market (Friedman, 1982). Indeed, "inequality and a lack of economic democracy pose serious threats to the effectiveness of capitalism" (Driver & Thompson, 2002, p. 122). Thus, an unfair growth, i.e. a growth that does not bring benefit to many in terms of employment opportunities, is bound to turn into recession, preventing the same capitalist system to maintain the growth over time (Clarke, 1995; Deininger & Squire, 1998). This vicious circle has intrinsically such an intelligence that it suggests there is nothing inherently perverse about bad circuits, which can evolve in virtuous cycles.

3. A systemic model on sustainability

A systemic conceptual approach is particularly suitable for explaining the viability of complex paths toward sustainability, which is helped rather than hindered by technology. By reviewing the existing theories on collective, organizational and individual goals, tackled by researchers with different scientific backgrounds (economics, psychology, sociology and educational science), this research strives to provide an integrated perspective by giving coherence and complementarity to needs and patterns that often are described as independent or even incompatible (Maxwell, 2013). A conceptual framework "explains, either graphically or in narrative form, the main things to be studied – the key factors, concepts, or variables – and the presumed relationships among them" (Miles & Huberman, 1994, p. 18).

To represent the multifaceted nature of a sustainable society, a linkage map is provided as a framework for connecting and combining many dimensions, layers, and interests. It is clear that the world is too complex and dynamic to simply portrait it into a map, but it is even clearer that the future cannot be explored or shaped by the thought that "places parts and wholes, order and chaos, individuals and environments and logic and creativity in opposition to one another" (Brown, 2015, pp. 214-215).

Thinking in terms of different actors at different scale levels is necessary to explore paths that offer collective benefits in a framework incorporating various perspectives. In terms of social structure, at least three different levels can be distinguished, namely macro, meso and micro levels, because decision-making and learning processes occur at all levels within a society: governments,

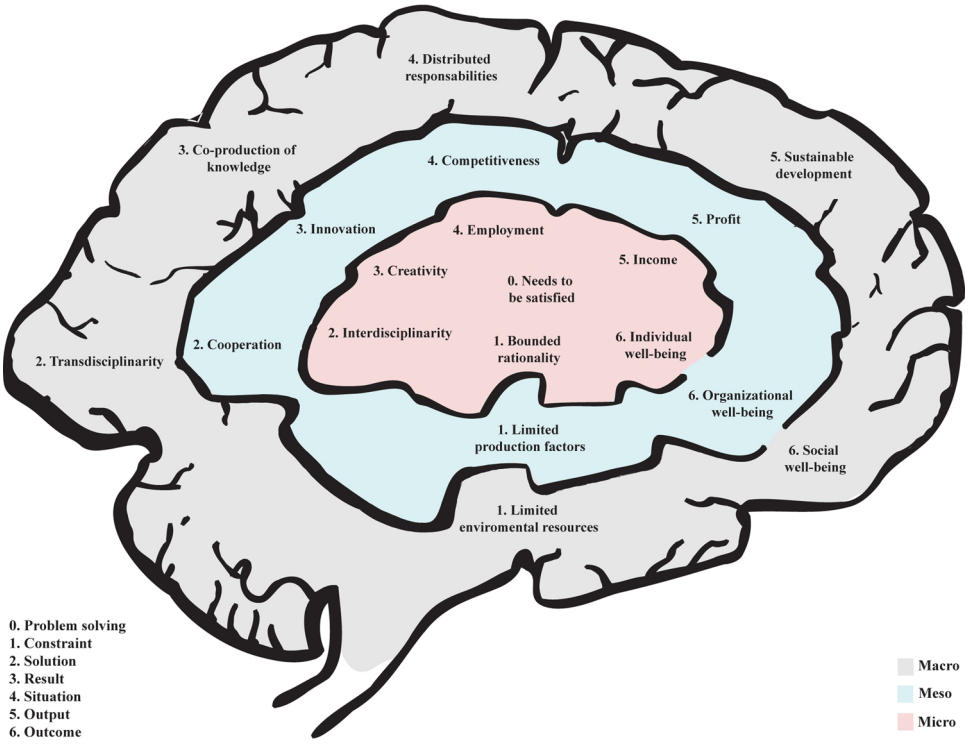

Fig. 1. A sustainability linkage map including multi-levels and multi-objectives systems.

organizations, individuals (Matsuura, 2009; Stiglitz & Greenwald, 2015). This articulation in macro, meso and micro levels shows similarities with the classification used by Rotmans, Kemp and Van Asselt (2001) to describe the transition to sustainable development. Other aggregation levels are possible, even though the stratified structure envisaged here could be a point of departure to reflect on a suitable framework that supports the labour market participation of people living in a complex technological environment. The multilevel structure implies that a dynamic equilibrium can be reached if developments at a given level gel with developments in other domains.

The interactions and connections between the different levels are shown in Fig. 1. The dynamic balance of perspectives is represented by three concentric and interacting systems, all having the shape of a *brain*. The setting of each system is a *brain*, since the thinking is a mental activity typical of human beings, and there are always human beings and their bounded rationality behind the organizations and governments (Simon, 1972). Moreover, each *brain* is articulated in a sequence of steps (circuit) to highlight the idea of learning process occurring at the macro (government), meso (organization) and micro (individual) levels.

More specifically, macro, meso and micro systems have as common *problem solving* (0) the satisfaction of multiple needs, which are subjected to several types of *constraint* (1), consisting of limited environmental resources, limited production factors and bounded rationality, respectively. For each decision-makers, Fig. 1 also shows the main *solution* (2) that produces a *result* (3) leading to a *situation* (4) conductive to the *output* (5) and *outcome* (6) objectives. In its first meaning, the map can be read as follows:

- governments should promote the *transdisciplinarity* approach (2) that enables the *co-production of knowledge* (3) leading to a situation of *distributed responsibilities* (4) for achieving *sustainable development* (5) and *social well-being* (6);
- organizations should foster the *cooperation* (2) with the government, other organizations and their own workers to generate *innovation* (3) for improving or maintaining their *competitiveness* (4), which is essential to achieve satisfactory levels of *profit* (5) and *organizational well-being* (6);
- individuals should invest in *interdisciplinarity* (2) to develop *creativity* (3) that is increasingly required to be (well) *employed* (4), and to have an *income* source (5) and *individual well-being* (6).

The different positions of each system are shown through circles, nested inside each other, since the intelligence of bigger systems depends on the intelligence of the smaller ones. Each system is intended as a decision-maker who must share the standpoint of the other decision-makers to face dynamically complex issues and strategic choices in a sustainable manner. As emphasised by complexity science, “systems are comprised of hierarchical layers, which both affect and are affected by each other” (Derbyshire, 2016, p. 49). The most internal circle represents the individual, who must make decisions and be responsible for his/her well-being within a set of wider circles, intended as organizational context and social environment in which the individual’s well-being is pursued. With an eye to the future, each system can be seen as an *intelligence in action* that “tries to achieve the objective (goal-seeking systems) or to

respect the constraint or limits (constraint-keeping systems)" (Mella, 2012, p. 123).

In a given brain-circuit, each step is instrumental for the subsequent stage, but the same step determines those conditions that reinforce the specific dynamics in other circuits, with clear opportunities and boundaries to what it can and should do. In particular, Fig. 1 also highlights the need of an interactive multi-goal approach for combining the expectations of multilevel actors. Macro, meso and micro systems are strongly interconnected, as shown by the repetition of numbers 1–6 at the three levels. The same numbers are used to denote the existence of various interdependencies among systems, as explained here below.

1 Individuals, organizations and governments share the common constraint of bounded rationality and compete for limited resources to satisfy their own needs (Gigerenzer & Selten, 2002).
2 Transdisciplinarity requires the cooperation between academic experts and social actors with interdisciplinary perspectives and sufficient mutual trust to adopt a more holistic approach (Aram, 2004; Choi & Pak, 2006).
3 The individual's creativity is the most important factor of organizational innovation (Amabile, 1988), but innovation is stimulated by the co-production of knowledge (Etzkowitz & Zhou, 2006).
4 The work of creative individuals makes an important contribution to organizational competitiveness (Baer & Oldham, 2006) but firms' competitiveness depends also on the purchase decisions of powerful stakeholder communities, which are ready to champion organizations acting in a socially responsible manner (Creyer, 1997; Maignan & Ferrell, 2004).
5 The ultimate goal of an organization is to make a profit to satisfy its shareholders, once the legal obligations towards its employees and other contractual stakeholders have been fulfilled (Feurer & Chaharbaghi, 1994), but sustainability can aid in the long-term profitability, if the company is committed to balancing the interests of all stakeholders, including local communities, non-governmental organizations, and the general public (Epstein & Roy, 2001; Epstein & Roy, 2003).
6 The flourishing of persons and systems are strictly interrelated, requiring the simultaneous and dynamic achievement of well-being for individuals, organizations, and communities (Prilleltensky, 2012).

Therefore, the scheme should not be regarded as a frame that can be automatically adopted, but as the core of an emergent conversation that compels participation and awareness of interdependence. It should be stressed that, even though not explicitly included in Fig. 1, technological progress plays a critical role because it allows the development of those solutions (2) supporting the social, organizational and individual well-beings. More specifically, new technologies facilitate the development of transdisciplinary knowledge (Palagin, 2013), collaborative work (Gallivan & Srite, 2005), and interdisciplinary learning (Redmond & Lock, 2006).

The map has the merit of visualizing the key aspects that can drive macro, meso and micro intelligent systems without ignoring their unitarity, because the three concentric, interacting and interconnected circles can be also seen as a single dynamic spiral. "Basically, learning starts at an individual level, which forms the vital base for group, organisational and societal learning" (Schauppenlehner-Kloyber & Penker, 2015, p. 62). The multi-layered model presented in Fig. 1 can also be described as a *mental* map that guides the systems through the complexities of the world, even though each simplified representation of reality necessarily implies a loss of detail (Stewart & Cohen, 1997). While it is clear that the three levels interact with each other, it is important to look more closely at each system to shed light on the related solution.

3.1. Government: transdisciplinarity as solution requiring a new education policy

Fig. 1 identifies transdisciplinarity as solution that should be promoted at the governmental level to facilitate a process of co-production of knowledge, which is crucial to encourage joint actions and distributed responsibilities among diverse stakeholders in the context of sustainable development and social well-being. In fact, transdisciplinary is increasingly invoked as appropriate means to address real world problems in accordance with the goals of sustainability, by "bridging the gap between problem solving and scientific innovation" (Lang et al., 2012, p. 40).

Despite the human need for innovation and progress, it is unquestionable that the benefits and the increased wealth generated by science and technology have accrued to social groups in a highly uneven manner (Nowotny et al., 2001). If technological progress is inevitable, this does not mean that inequality is also inevitable, because a change in policies can lead to a more egalitarian society. Governments are often viewed as having a special responsibility in providing the right incentives, in setting priorities and in using their regulatory powers to orient socio-technical developments in desirable directions (Rip & Kemp, 1998).

According to Stiglitz (2007), governments should play a more active role in promoting high levels of employment, social justice and environment protection to make sure that in the future there will be more winners and fewer losers from the process brought about by globalization and technology. To reverse inequality, Stiglitz (2007, 2012) recommends a wide range of institutional policies, such as the implementation of better financial regulations, the improvement of corporate governance, the strengthening of the voice of workers and unions in the workplace, the enforcement of laws against monopolies and discrimination, the increase in government support for investments in education, technology, and infrastructure, the introduction of public policies that may succeed in re-directing innovation, for example by forbidding investments that threaten the saving of natural resources. In Stiglitz's view, a more progressive income taxation could both reduce inequality and stimulate the economy. The government should tax the rich more than the poor and provide systems of good social protection to limit the extent of inequality. Moreover, productive activities and work wages should have lower tax rates than those applied to returns on financial speculation.

Similar solutions are recommended by Kotler (2015), who also suggests additional initiatives to combat unemployment, such as sharing the work by reducing the average workweek to thirty-five hours or by establishing a three-day workweek of eleven hours a day; offering longer unpaid vacations; increasing the programs in job training and retraining, especially to reduce the shortage of

workers in some industries (e.g., computer programming, certain engineering areas and the Internet); incentivizing young people to pursue studies in the fields of science, technology, engineering, and mathematics (STEM); undertaking vigorous programs designed to rebuild deteriorating infrastructures; establishing social wages for people who, despite their efforts, have not been successful in finding a job. In Kotler's perspective, governments should find funds for these programs by either printing more money or imposing higher taxes, even though the former has the potential of producing runaway inflation, while the alternative could become harder because of citizen resistance to higher taxes in an economy with an increasing number of poor people.

No objections are raised against the measures proposed by the quoted authors. The only objection is that the widely recognized definition of sustainable development reported in *Our Common Future* (World Commission on Environment and Development, 1987) is an elastic concept (Knutsson, 2013), which has led to multiple definitions and interpretations (Dobson, 1996; Jickling & Wals, 2008; Martens, 2006). The variety of perspectives from which sustainable development can be interpreted and applied is strictly linked to its multiple domains (the economic, the ecological, and the socio-cultural domains) but also to its pluralistic view (Öhman, 2006). Solving sustainability cannot be restricted to simply legitimizing a predefined agenda, formulated and transmitted from a selected pool of scientific experts, while it requires reflexive and creative processes whereby various stakeholders are empowered to actually influence the agenda and co-generate new meanings and criteria (Popa, Guillermin, & Dedeurwaerdere, 2015).

For this reason, Fig. 1 suggests transdisciplinarity as solution that governments should pursue to promote a co-production of knowledge that, in turn, enhances the awareness of rights and responsibilities among people, because "governments have no answers that are independent of the attitudes and behaviours of individual citizens" (Blewitt, 2013, p. 24). Making "all participants more reflexive" (Gibbons, 1998, p. 9) and compelling a sort of border-crossing, transdisciplinarity is "a research process that includes the practical reasoning of individuals with the constraining and affording nature of social, organisational and material contexts" (Lawrence & Després, 2004, p. 399), by "looking at the dynamics of whole systems" (Choi & Pak, 2006, p. 355), especially when "complex phenomena are self-organizing, self-maintaining, and tend to be nested within (arising from and giving rise to) other systems" (Davis & Sumara, 2009, p. 36).

In the realm of sustainability, the cross-disciplinary methodology of transdisciplinarity promotes participatory processes, "looking for patterns that connect rather than boundaries that divide" (Brown, 2015, p. 213) and engaging "a move from science on/about society towards science for/with society" (Scholz & Marks, 2001, p. 236). Hence, as underlined by Fig. 1, transdisciplinarity is a method that supports the co-production of knowledge, i.e. a collaborative process where multiple disciplines and stakeholders of society are involved to achieve solutions to complex problems related to human-environment relations (Klein, 2014; Pohl, 2008; Walter, Helgenberger, Wiek, & Scholz, 2007; Wickson, Carew, & Russel, 2006). "The emergence of a socially distributed knowledge production system means that this type of knowledge is both supplied by and distributed to individuals and groups across the social spectrum" (Gibbons et al., 1994, p. 14).

The socially distributed knowledge is a decisive factor for sharing decision-making and responsibilities, because sustainable development is also grounded in a strong element of individual responsibilization. If one accepts the foundation of the responsibility, one feels responsible and takes moral responsibility for the environment and the society (Andersson, Öhman, & Östman, 2011). More precisely, the individual subject is expected to take on the responsibility for sustainable development by means of certain consumption patterns, self-regulation, and mobilization of necessary entrepreneurial skills (Knutsson, 2013).

Despite its benefits and pertinence for sustainable development (Kläy, Zimmermann, & Schneider, 2015; Schauppenlehner-Kloyber & Penker, 2015; Wickson et al., 2006; Zscheischler & Rogga, 2015), transdisciplinarity is still not mainstream because of conceptual, institutional and social barriers (Boyd, Buizer, Schibeci, & Baudains, 2015; Lawrence, 2015). To ensure the co-production of knowledge, governments should give an increased space to education, because social well-being increases with education (Keyes, 1998). Education is the crucial tool for enabling people to think and act responsibly but also autonomously in order to be effectively engaged in sustainability issues regarding the environment and the society (Andersson et al., 2011; Gibbons, 1998; Knutsson, 2013). Put in other way, governments cannot push through developments in a unilateral and top-down manner, but they may stimulate a collective learning process about possible solutions, by encouraging other actors to think along and participate (Rotmans et al., 2001).

The aforesaid reflections are here taken into account to introduce a new solution, never proposed before. As previously mentioned, governments should understand that everything they do needs to be recalibrated around the paradigm of equality and sustainability, by starting from education, which empowers people to assume responsibility for creating and enjoying a sustainable future. However, a pronounced rise in wage inequality and unemployment is driven by labour-saving innovations (Stiglitz & Greenwald, 2015). Hence, a new regulatory framework is needed for providing incentives for educational investment rather than locking businesses into existing technological trajectories. A fiscal system that encourages education and social innovation should be designed to encourage the formation of human capital. This incentive can take the form of tax deductions or lower tax rates. "Taxes are reduced on things we want to encourage, such as work, saving and investment, and raised on things we want to discourage such as wasteful energy use and pollution" (Olson, 1994, p. 164). For example, environmental taxes may correct market failures which inhibit green growth (Jacobs, 2013). In particular, companies that do not pollute should have a lower tax rate than that applicable to non-green firms, in accordance with the "polluter pays principle" (OECD, 1975).

With a similar mechanism, the proposal advanced here is that the government should establish a strict regulation requiring firms to ensure the employment and/or education of people. Companies that employ many workers (i.e., labour-intensive companies) should have a relatively low tax rate, since they contribute to generate income for many people. On the contrary, companies with a few workers (i.e., capital-intensive companies or labour-saving companies), including hi-tech companies, should have a relatively high tax rate, since they do not contribute to the employment of many people, unless they decide to contribute to the employment of future generations. In the absence of their contribution to the employment of future generations, these hi-tech companies should have

a higher taxation burden because they can today gain high profits, despite low labour costs, mainly thanks to labour-saving technological changes emerging from past research conducted by other firms and their respective workers.

However, to enjoy lower taxation, these hi-tech companies, which exploit technological outcomes and productivity improvements achieved through past research and public knowledge, could be given the opportunity to commit themselves to supporting education in the present and, thus, the employment in the future, in compliance with the principle of sustainability, based on the equity and solidarity among generations. This goal can be obtained by providing that where labour-saving companies decide to finance the education of young people, they shall be taxed to the same extent as companies that currently employ many workers. In addition to fiscal incentives, labour-saving firms should have complete discretion concerning the field (e.g., ICT, culture, medicine, agriculture) and the institution (e.g., university, college, high school) to fund, by paying the tuition costs for students. In this way, the favourable fiscal treatment reserved for labour-intensive companies can be rightly extended to capital-intensive companies. In this case, it is right to offer the same fiscal treatment both to companies employing many workers and to the ones employing few workers because the former already ensure the employment of many people at the present time, while the latter ensure the employment of future generations, by taking care of their education. Investing in education means creating conditions that enhance the next generation's ability to reach its potential, to have employment opportunities, to create other useful changes for setting start-up companies or for revitalizing existing companies, especially if the scheme proposed here is adapted to provide lifelong education to a large public (Kim, Kim, & Lee, 2017).

In any case, capital-intensive companies would be asked to contribute to the reduction of inequality that they themselves have caused by using labour-saving innovations. The aforesaid mechanism should achieve the reduction of inequality, since the income inequality is above all the result of a lack of education opportunities in the early stages of lifespan. The education when young is critical in laying the foundations for future learning skills, such as learning to learn and developing positive attitudes toward learning throughout the lifespan (Medel-Añonuevo, Ohsako, & Mauch, 2001). Education is still at the margins because of lack of financial resources and governmental support, but if "education systems are characterized by inequality, discrimination and exclusion, they risk perpetuating or even deepening the social and economic disparities that exist" (Matsuura, 2009, p. 13). Essentially, educational poverty causes employment vulnerability, economic inequality and social exclusion.

Education, more than income, is what should be distributed among collectivity members. Therefore, the debate on the Minimum Income Guarantee (MIG) should be replaced by the debate on the Maximum Education Guarantee (MEG), which is a more dignified, effective and sustainable solution. Only the expansion of the higher-education and academic-research sector can provide "society with a realm in which different representations can be entertained and recombined in a systematic manner" (Etzkowitz & Leydesdorff, 2000, p. 119). The Japanese experience is instructive in this regard. Japan's extraordinary economic and social development is explained to large extent by its comparatively early emphasis on massive education and training, provided by both public and private sectors, interacting with each other (Sen, 2007).

In addition, the proposed scheme should serve the best interests of capital-intensive companies, because in this way they have the opportunity of paying lower taxes but also the chance of choosing directly the field of education to support financially. Business organizations that are more embedded in educational organizations are more likely to trigger processes of mutual learning, to develop new cooperation in order to understand and face complexity, to fine-tune their assumptions on future operating conditions, to build shared knowledge and vision, to fill the gap between demanded and supplied skills. The empowering of companies is important to make them aware of their responsibilities toward the national industrial policy. Firms' empowerment is beneficial, since companies have often more entrepreneurial vision than public decision-makers and a greater propensity for innovation than the government (Senge, 1997). No entrepreneur would support a business that, in his view, is expected to disappear or to be a loser business. Being continuously in touch with their customers and society, firms have a higher diagnostic ability to understand what new needs are expressed by the market and what investments in research/education are required.

Therefore, thanks to this proposal, the boundaries between science and practice should disappear, in compliance with the transdisciplinary approach, which recommends the cooperation between researchers and societal actors (Walter et al., 2007). Open, democratic and participated processes, along with the government's role in preventing negative externalities, should reduce the weight of those who currently monopolize educational opportunities. "Actions are the responsibility of each individual, and if they clash with common interests, there ought to be some kind of societal restriction through common ideologies or policies" (Sund & Lysgaard, 2013, p. 1601).

In practical terms, the aforementioned proposal can be easily implemented based on metrics used to detect capital- and labour-intensive industries/firms. "Capital and labour intensities are represented by the same measure: capital per employee. A high ratio indicates a capital intensive industry and a low ratio a labour intensive one" (Hirsch, 1975, p. 310). As regards labour- and capital-intensive firms, the literature has suggested several ratios, such as capital-to-labour ratio (Baum, Caglayan, Ozkan, & Talavera, 2006), revenue per employee (Ballester, Livnat, & Sinha, 2002), total labour costs divided by total sales or by total assets (Lajili & Zéghal, 2005), number of employees divided by revenues or by assets (Dewenter & Malatesta, 2001), ratio of labour and pension expenses to sales (Agrawal & Matsa, 2013), ratio of net property, plant, and equipment to number of employees (Hendricks & Singhal, 2001), ratio between wage costs and non-wage costs (Hansson, 1997). In general, depending on the parameter selected, firms with ratio values above or below the median ratio value of industries will be classified as labour- or capital-intensive. It is worthwhile noting that the proposal suggested here should be easily operationalized because most parameters above mentioned can be drawn from the financial statements of firms and especially because, as shown by "existing surveys of public opinion, proposals to increase public spending on education are supported by huge majorities in most Organization for Economic Cooperation and Development (OECD) countries" (Busemeyer, Garritzmann, Neimanns, & Nezi, 2018, p. 35).

3.2. Organization: cooperation as solution spurred by technological innovation

The meso level of Fig. 1 captures the essential aspects associated with the continuity perspective of organizations, by underlining that, under conditions of limited availability of resources, firms should benefit from cooperation to generate innovation and competitiveness. In a technologically dynamic environment, only organizations with a systematic policy of innovation are likely to establish a long-term competitive advantage (Bayus, Erickson, & Jacobson, 2003; Drucker, 1999), being "more flexible, more adaptable, and more capable in dealing with market pressures than non-innovating firms" (Geroski, Machin, & Van Reenen, 1993, p. 1999).

As shown by Fig. 1, competitiveness is a condition for being able to remain profitable, and profit is still the *sine qua non* for all firms, including for those operating at higher levels of social responsibility. Indeed, "the public does expect business to become socially involved, but not at the expense of its primary mission, that of making a profit and thereby contributing to a healthy and vigorous economy" (Hay & Gray, 1974, p. 143). Fig. 1 also shows that stable profits are important for the organizational well-being, by reducing the need for corporate employment downsizing (Probst, Jiang, & Benson, 2018). By providing more secure employment conditions, "organizations can positively impact the health and well-being of their workers and families, and in doing so, proactively contribute to the long-term financial success and well-being of the organization itself" (Probst, 2009, p. 404).

Moreover, Fig. 1 stresses that cooperation is a determining factor in organizations' success. Cooperation is a solution that organizations should implement in various directions by cooperating with the government, other organizations and individuals. This cooperation is facilitated and encouraged by technological progress that itself is developed to perform the cooperation of *man with machine*. Despite the commonly quoted dichotomy regarding *man against machine* (Bowen, 2016), machines and appliances have been so far developed with the aim of enabling a dialogue, communication and collaboration between man and machine.

More interestingly, technological innovation has reshaped the landscape of knowledge-based economic development, by supporting the pursuit of public-private partnerships and the development of relations among firms of different sizes and types (Etzkowitz, 2003). As regards the role of public-private partnerships, it should be not forgotten that most of the successful innovations in the United States have occurred in research parks adjacent to universities, suggesting that many firms were benefiting from knowledge produced in the universities (Stiglitz & Greenwald, 2015). Original innovations were often generated by universities and public laboratories, under government procurement contracts (Rip & Kemp, 1998).

Furthermore, the expected technological and economic benefits from collaboration drive firms to develop interorganizational relationships in the form of private partnerships. Modern technology infrastructures facilitate integrated supply chain activities, resulting in improved performance for firms involved in a partnership (McCarthy-Byrne & Mentzer, 2011). Intra-firm cooperation is important to share risks, costs, benefits, knowledge and expertise. Under higher technological uncertainty, many firms have expanded their portfolio of R&D partnerships to seek more opportunities to learn, to scan multiple external sources of knowledge and to increase their performance (Frankort, Hagedoorn, & Letterie, 2011). In particular, technological progress can spur the cooperation between large and small firms. Increasingly, large firms are outsourcing innovation to small companies, by supporting start-up firms (Auerswald & Branscomb, 2008). A start-up venture can be seen as an embryo of innovation less feasible to integrate into organizational routine. More in general, disruptive innovations create new markets and groups of consumers, not only through the development of new technologies and products, but above all through the implementation of new business models and strong governance networks (Christensen, 2006; Schaltegger, Hansen, & Lüdeke-Freund, 2016).

The sharing economy, also termed *connected consumption* or *collaborative consumption*, is evocative in this regard, showing that technological infrastructures contribute to new forms of cooperation with widespread benefits, even though various factors could reduce the distribution of those benefits (Schor & Fitzmaurice, 2015). Fuelled by developments in ICT, the sharing economy is an emerging economic-technological phenomenon, consisting of "the peer-to-peer-based activity of obtaining, giving, or sharing the access to goods and services, coordinated through community-based online services" (Hamari, Sjöklint, & Ukkonen, 2016, p. 2047). The sharing economy has many virtues: it combines technological progress and social ties; it is a capability amplifier and network accelerator; it enables participation and distribution mechanisms; it democratizes the access to services and information by reducing both buyers' prices and sellers' risks; it generates economic gains by deploying unused assets and by facilitating the recirculation of goods; it promotes cooperative practices (Schor, 2016). Thus, thanks to technological progress, the trade-off between competition and cooperation becomes less severe, confirming what is an axiom in systemic models. "Nothing is ever influenced in just one direction" (Senge, 1999, p. 75).

The cooperation with workers is not less important for innovation. To build and maintain their competitive advantage, companies increasingly rely on team creativity (Parboteeah, Hoegl, & Muethel, 2015). "Employee creativity is vital for entrepreneurial activities and long-term economic growth" (Probst, Stewart, Gruys, & Tierney, 2007, p. 480). Thus, paraphrasing and updating the concept of *creative destruction* (Schumpeter, 1950), the paradigm of *disruptive creativity* could be considered as a new evolutionary character of the capitalist process and as a further *modus operandi* of competition.

The employer's need for employees' creativity as source of firm's innovativeness should be welcomed since innovative behaviours require a climate of organizational justice, and employees reporting positive well-being tend to demonstrate higher job performance (Cleveland, Byrne, & Cavanagh, 2015). Employees who perceive their organization fair and supportive are psychologically motivated to be innovative and engage themselves in spontaneous behaviours that help the organization reach its objectives of innovation. Employees can bring considerable knowledge, skills, and abilities to their organization when the latter is built on cooperative, socially responsible and integrated decision-making (Stazyk, Moldavanova, & Frederickson, 2016). There is fruitful literature showing the positive relationship between organizational justice and individual innovative behaviours at work (e.g., Greenberg & Colquitt, 2006; Janssen, 2000; Unsworth & Clegg, 2010). Conversely, empirical studies demonstrate that work environments affected

by measures of downsizing and job insecurity have a negative impact on creative problem-solving abilities of employees (Amabile & Conti, 1999; Probst et al., 2007).

In an economy based on knowledge-intensive organizations, managers, especially HR managers, are expected to be capability builders, by stimulating workers' innovative behaviours, cooperation and problem-solving skills. Unlike from the past, managers may be considered not as the major firm sensors, but as the most important influencer for the sensing behavior of others (Cunha, Palma, & da Costa, 2006). For managerial theories and practices, there is still much to be gained from crossing several disciplines and several layers, by considering the individual/personal (micro) level and global/societal (macro) level. The managerial system cannot be based only on traditional HRM disciplines, such as industrial and organizational psychology and labour economics, but it must span and creatively work together with other "disciplines and among the multiple levels of the organization and the larger environment" (Cleveland et al., 2015, p. 156).

Therefore, integrating multiple perspectives and needs are the keys to successful business strategy in the 21st century. Problems of societal relevance require that scientific disciplines leave their comfort zone of rationality to serve the societal expectations and values of citizens (Zscheischler & Rogga, 2015). The adoption of sustainable practices and their effective communication provide firms with competitive advantages (Delmas & Aragon-Correa, 2016), since socially and environmentally practices enhance the loyalty of stakeholders (customers, suppliers, employees, and the community in which the companies operate) and potentially lead to additional financing opportunities, taking advantage of sustainability-oriented incentives, such as grants and tax cuts (James, 2013).

3.3. Individual: interdisciplinarity as solution for developing creativity

At the core of Fig. 1 is the individual, who should be the origin but also the end of any discourse on sustainability and well-being. At this level, interdisciplinarity is regarded as the solution that could help develop creativity, which has been found to be associated with positive impacts in terms of employment, income opportunities and consequent well-being. It is unquestionable that the individual well-being, which affects the organizational and social well-being, is in turn affected by employment and income levels. The lack of employment leads not only to a loss of income but also to deleterious effects on the general functioning and psychological well-being of individuals (e.g., Argyle, 2011; Creed & Macintyre, 2001; Giambona & Vassallo, 2014; Green, 2011; Murphy & Athanasou, 1999).

However, in a *liquid* society, where the change is the only permanence and uncertainty is the only certainty (Bauman, 2000), also the employment relationship becomes more fluid, with the consequence that the job insecurity can be individually addressed or countered if jobs are reinvented and new opportunities are created. Skills, which continue to be the best guarantor of social mobility and employment opportunity, have become much more varied and dynamic than in the past, requiring to be updated and fine-tuned throughout working lives. While in the past people were likely to be full-time employees with permanent contracts based on previously acquired skills and knowledge, in the global landscape people's working life becomes a sum of many work experiences and projects. If lifetime employment within the same organization may no longer be guaranteed, workers are compelled to take responsibility for their own job security and are encouraged to actively manage their own career by an open-minded approach to job and task changes (Van Dam, 2004). Thus, the stability of employment over time consists no longer in making a single enduring job, but in a sequence and repertoire of different jobs, supported and spaced out by phases of training and learning (Gombrich, 2016). Living on average longer, people are asked not only to work longer but also to make themselves available and ready to change employers or jobs numerous times with the support of education.

Education is intended here as *lifelong* education, covering "formal, non-formal and informal patterns of education, and … characterized by flexibility in time, place, content and techniques of learning" (Dave, 1976, pp. 35-36). The flexibility that is demanded to workers is a direct consequence of the flexibility demanded to firms to be competitive. Moreover, the flexibility that is required to workers, who are more likely to change employers, jobs, protection status, sectors and even countries, should be appreciated, not demonized, because in this way people can enrich their own experiences, extend their own relationships, reinforce their own self-esteem and broaden their own cultural horizons.

The enlargement of individual knowledge is the most natural and coherent answer to the challenges posed by the fourth industrial revolution. In the age of *augmented* reality and *additive* manufacturing technology (Huang, Liu, Mokasdar, & Hou, 2013), the workers' knowledge should be *augmented* and *additive* as well, since their satisficing choices depend on the width of information. Likewise, if analysing Big Data requires an interdisciplinary understanding of complexity, expertise in diverse disciplines is highly recommended (Calvard, 2016). Specialization in one field is no longer a sufficient winner approach, also because today's jobs may fall out of fashion in the short space of a few years (Galbraith, 2012). Therefore, tertiary education or even STEM skills are not sufficient and are becoming less and less a source of comparative advantage, which is increasingly based on a combination with other fields of knowledge and other types of skills, problem-solving skills especially (OECD, 2017).

For this reason, Fig. 1 considers "interdisciplinarity as a means to address complex problems that cannot be dealt with from a single disciplinary perspective alone" (Bridle, Vrieling, Cardillo, Araya, & Hinojosa, 2013, p. 23). Having a heterogeneous knowledge should be considered as an individual strategy to improve one's own problem-solving ability. Broader analytical skills and transversal knowledge, together with the ability to connect different perspectives from different disciplines, are the key factors for employment chances, increasingly linked to problem-solving skills (Ivanitskaya, Clark, Montgomery, & Primera, 2002). "Inter and transdisciplinarity thus become the key notions for a systems approach to education and innovation" (Jantsch, 1972, p. 107). While transdisciplinarity includes actors both from within and outside academia (Mobjörk, 2010), an interdisciplinary approach integrates "separate disciplinary data, methods, tools, concepts, and theories in order to create a holistic view or common understanding of a complex issue, question, or problem" (Bruun, Hukkinen, Huutoniemi, & Thompson Klein, 2005, p. 28).

By taking an interdisciplinary perspective, people learn to understand the consequences of actions from a macro viewpoint, i.e. according to the perspective of sustainable development. As also remarked by Martens (2006), the extent to which people "will be prepared to make decisions in favour of a sustainable future depends on the awareness, knowledge, expertise, and values they have acquired during their studies and in the subsequent years" (p. 40). He also adds that the range of skills individuals need to make decisions in favour of a sustainable future is so wide that it can only be acquired through an interdisciplinary learning.

Most importantly, the interdisciplinary profile is recommended for developing a creativity orientation in response to problematic situations (Hoidn & Kärkkäinen, 2014; Starko, 2017). "Effective use of creative learning procedures requires the individual to be familiar with and skilled in drawing from different theoretical and practical perspectives" (Treffinger, Isaksen, & Firestein, 1983, pp. 13-14). According to the European Political Strategy Center of the European Commission (EPSC, 2016), "creativity, emotional intelligence and transversal skills are undoubtedly what will make the difference in the future" (p. 5). Despite the variety of definitions (Parkhurst, 1999), creative thinking can be defined as the ability to become sensitive to problems and difficulties, to see things in fresh ways, to identify problems, to produce new ideas, to find answers to many unsolved problems, to learn from experience and relate it to new situations, to use non-traditional and unusual approaches to solving old problems, to create something unique and original (Guilford, 1967; Isaksen & Treffinger, 2004; Treffinger, 1980; Wang, 2012).

Creativity "occurs when cognitive and non-cognitive traits (emotion and rationality) interact synergistically through divergent and convergent thinking" (Lozano, 2014, p. 207). Creativity reproduces the same concept underlying the success of the fourth industrial revolution. Coming to think of it, what is called *Industry 4.0* is only and simply a convergence of existing technologies. Combining what is already available in the technological fields, organizations are empowered to do new and different things, or to do the same things in a better way. Similarly, creativity means combining and synthesizing multiple knowledge and skills in novel ways, just like Industry 4.0 means combining and synthesizing multiple technologies in novel ways.

What is most interesting is that creative jobs are *good* jobs, as shown by probably the first quantitative study that specifically analyses the connection between creative jobs and average levels of well-being. Particularly, by using a large national UK data set, Fujiwara, Dolan, and Lawton (2015) found that creative jobs have higher average levels of life satisfaction, worthwhileness and happiness than the levels for the workforce in general, although most creative occupations also have higher average levels of anxiety. Moreover, other studies reported that employees' creativity is positively related to job performance (Gong, Huang, & Farh, 2009; Oldham & Cummings, 1996).

The likelihood of many occupations to be creative has been investigated by Bakhshi, Frey and Osborne (2015), who used predictive models for the US and the UK labour market. The researchers found that creative jobs cover a broad range of occupational categories. Even more importantly, Bakhshi, Frey, and Osborne (2015) displayed other two important results: 1) creativity is inversely related to computerizability; 2) many of the occupations, which are intensive in creative tasks, are jobs that are directly associated with the arrival of new technologies.

Creativity is a crucial attribute that can also contribute to corporate governance changes by involving employees in decision-making. Employee involvement schemes that are built on greater personal autonomy for workers, and not just for traditional managers, should be evaluated carefully (Green & James, 2003). According to a common belief, innovative organizations are not managed hierarchically, but they rely on self-organization, dispersed influence, individual self-management capabilities (Lengnick-Hall, Beck, & Lengnick-Hall, 2011). Individual self-management capabilities are crucial to allow people to be equipped with sufficient knowledge and skills to make decisions, to be independent, to be *entrepreneurs of themselves*.

This means that technological expertise must be coupled with a high level of managerial skills (Berger & Frey, 2016; Moore & Davis, 2004). Training in self-management is crucial for all individuals, as it "teaches people to assess problems, to set specific hard goals in relation to those problems, to monitor ways in which the environment facilitates or hinders goal attainment" (Frayne & Latham, 1987, p. 387). Moreover, individual self-management skills, along with self-leadership, are likely to result in shared leadership processes within a team, improving caring and solidarity among group members (Houghton, Pearce, Manz, Courtright, & Stewart, 2015).

It is worth concluding by noting that the study by Lyubomirsky, Sheldon, and Schkade (2005) provides further support for the implications discussed here. In particular, according to their review, people's happiness or subjective well-being is associated with a wide variety of factors, including self-efficacy or autonomy, superior work outcomes (e.g., greater creativity, increased productivity, higher quality of work, and higher income), larger social rewards (e.g., stronger social support and richer social interactions), cooperative behaviours (e.g., a greater interest in helping others and an inclination to act in a prosocial manner).

4. Conclusions

The article began with the examination of complex phenomena so strictly and dangerously interrelated that a first analysis could lead to the conclusion that reducing inequality in a world increasingly globalized and technologized is a fundamental impossibility. The discussion strove to dismantle this common belief or concern by using provocative and critical analysis to deny the danger of a vicious circle.

The viability of diverse paths of economic development is discussed in an integrated and multilevel model. Fig. 1 has the aim of underlining the growing interdependence and convergence among systems (governments, organizations and individuals), since globalization means also a bigger overlapping of issues and interests at different scales. The *convergence* of approaches and thoughts at different levels is not surprising, because economics, before being a science of organizations and institutions, is a science of human beings, who need to develop self-sufficiency and self-management skills.

It is never superfluous to remember that the ancient Greeks have left to us the inheritance of the term *economics*. The Greek word

oikonomia (from οἶκος, house, and νόμος, law or rule) meant the management of the household "in its broadest sense (domestic economy, one might say), and not only in its strictly economic sense" (Austin & Vidal-Naquet, 1980, p. 8). For the Greeks, the economic ideal of the *oikos* was self-sufficiency, but the economy was not a separate sphere, being embedded in society in its widest sense (Austin & Vidal-Naquet, 1980). Put in another way, the "economics failed to attain independent status … [The ancient Greeks] merged their pieces of economic reasoning with their general philosophy of state and society and rarely dealt with an economic topic for its own sake" (Schumpeter, 1954, p. 50). However, this lack of independence seems today less paradoxical and ingenuous than in the past. Indeed, economics is so strongly intertwined with all aspects of human and social life that no system (individual, organization, collectivity, world) can function sustainably without considering the multiple interconnections between different layers and different disciplines.

In summary, six themes underpin the ideas presented in this paper.

A first scientific contribution consists in using an integrated, systemic and interconnected approach by developing a chart where multi-levels and multi-objectives systems are likely to work for sustainable development. "Especially in the field of sustainable development, integrative and participatory approaches gain in importance in order to create socially robust solutions" (Schauppenlehner-Kloyber & Penker, 2015, p. 59).

A second achievement is that there is no reason to fear technological progress and its erosion of jobs. Mismatch between technology and society can be accommodated through processes of learning and negotiation (Rip & Kemp, 1998). Innovation has not only beneficial but also *maieutic* effects on human beings. Besides improvements in the personal life, technological progress has beneficial effects because it is an important driver for cooperation. By depriving people of computerizable tasks, technological progress has *maieutic* effects because it stimulates and enforces people to engage in learning and creative activities, which can only improve their employability and well-being. If computers win at the level of routine processing, repetitive arithmetic, and error-free consistency, they lack intuition and creativity. Technological change, to the extent it favours those with higher skills and strong network relationships, stresses the importance of investing in education and sharing knowledge to remove the *real* causes of inequalities and to align individual and collective interests (Sen, 2001). When a systemic approach is used, technological progress appears as a facilitator for knowledge sharing as well as a driver for equality solutions rather than a source of inequality. However, technological progress cannot initiate a transformative change in people's life before people's minds have changed, and it is not possible to initiate a change in people's minds without the inclusiveness of societal actors in the production of knowledge, which is a pivotal feature of transdisciplinarity (Mobjörk, 2010).

A third important contribution from this paper is the right understanding of the role played by *fair* principles in economics. Contrary to widely held assumptions, economic rules do not tolerate persistent and pejorative situations of inequality. When managers take unethical behaviours to pursue their narrow and short-term self-interest, or even when incompetent policy-makers impose bad economic directions, the system, after some more or less dramatic consequences and over a longer or shorter period of time, is eventually able to react in the name of long-term social and individual benefits. The key question becomes how to minimise the extent and length of negative consequences that are caused by the delay of reaction time. If people are self-managed and well educated, if the levels of social conscience and responsibility are high, if prevention and repression of crimes are efficient, if transparency and good rules are looked after by policy-makers, a timely correction is possible, thus avoiding persistent and massive contagion of negative consequences in terms of inequalities (Mella, 2012).

A fourth contribution relies on the role of education, the most important determinant of equality. Education and interdisciplinarity (supported, but certainly not prevented, by technological progress) mean finding and re-finding jobs to reduce income inequality. If companies diversify their activities to reduce the risk in a situation of uncertainty, it logically follows that people should do the same thing, diversifying knowledge and skills to build their *portfolio of opportunities*. Education, including lifelong learning, may provide those equality opportunities which are harbingers of income equality. Thus, *working* for *sustainability* means, first and foremost, *educating/learning* for *sustainability*.

A fifth contribution consists of proposing a solution for sharing the costs of education. According to the proposal suggested above, capital-intensive firms should pay more taxes than labour-intensive firms, unless the former accept to contribute to the education of people. If capital-intensive firms opt for funding education, they will have the opportunity to contribute directly to society changes. Conversely, if capital-intensive firms decide not to benefit from lower taxation, governments will have more public resources (the taxes collected from those firms) to promote education and training. In both cases, there will be the effect of allocating increased resources to educational investments.

The previous considerations led to the sixth and last contribution: if economics was born as a science at the service of the household, everyone should master those principles useful for managing their own expectations of employment and well-being, by achieving self-management and problem-solving skills. This reinforces the thesis about the need for interdisciplinary knowledge and skills, which are salient tools to trigger a virtuous circle where values such as equality, human rights, democracy, and employment can coexist, complementing each other. This does not mean that sustainable development is all about individuals, but only that everyone has the responsibility to contribute to and enhance it.

All these implications confirm what was supposed in the premise of the paper: the goals of sustainability and employment can be realized only if all socio-economic actors, independently from their individual and collective nature, work together. This is another interesting and fair *caveat*: *equality* requires an *equal* engagement of *all*.

The present study is obviously not without limitations that can suggest some avenues for future research. To correct some downsides of technological progress, the paper proposes a new solution, based on labour-saving companies' involvement in financing education. Further research should investigate how this proposal, which is economically viable, could be improved to be politically and socially acceptable. Its design and implementation should be discussed with different stakeholders, e.g. scholars from various

disciplines, managers, policy-makers, workers and citizens, because the transdisciplinary approach calls for a reflexive questioning of the values, perspectives and assumptions to understand and address sustainability problems (Popa et al., 2015).

Moreover, in an attempt to explain complex phenomena succinctly in view of a better future, this study has privileged the analysis of virtuous circles, including positive externalities from education, while it has devoted less attention to the reality of vicious circles. For example, the research omitted to comment in depth on the role of innovations that, when not widely disseminated within the economy, may not be welfare enhancing as well as profits may be a bad measure of social contribution (Stiglitz & Greenwald, 2015). Such aspects deserve more attention because they may reduce or reverse positive effects, and their careful consideration could lead to a revision of the map reported in Fig. 1.

Complex phenomena are open to various, alternative and even divergent possibilities of interpretation and representation because of their extreme mutability and recursive nature. Accordingly, a graphical map could never account for complex phenomena that do not lead to a unique model or a unidirectional evolution. At best, it can serve as illustration of a possible and desirable coexistence of positive feedback loops, intended as mechanisms that amplify specific qualities or dynamics reasonably usable by the systems (Davis & Sumara, 2009). In this respect, the conceptual paper is the result of a (maybe, ambitious and creative) synthesis of fundamental concepts elaborated from the literature and basic assumptions behind it, even though the wished future seems to be far from the reality.

This view is the right one. At first blush, the overview provided by the present research might appear overly optimistic. Really, in retrospect, the challenging conditions and actions required to achieve simultaneously multiple well-beings highlight the complexity of a better scenario, which is a function not just of a single policy but of a large and long-lasting process of education and social empowerment. Educational and social innovations are no less important or less demanding than the technological innovations traditionally studied by economists (Stiglitz & Greenwald, 2015).

Despite the complexity of the challenges, the hope is that the analysis and lessons contained in this paper and the inherent literature will help achieve greater awareness about the need of *working for sustainability*. This need should be interpreted in two different ways. The first meaning is that all socio-economic actors, including governments, organizations and individuals, should *work* together *for* achieving *sustainability*. The second meaning is that the *work* of many, if not of all, is crucial *for* achieving *sustainability*.

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