

Preventing and Managing Natural and Environmental Disasters: Employment Protection, Welfare and Industrial Relations Systems

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1. Framing the Issue

The media and the public at large take a different approach when dealing with natural disasters, on the one hand, and environmental and technological hazards, on the other hand. The former (earthquakes, tsunamis, floods, hurricanes and so forth) generate feelings of impotence and resignation, which in turn fuel apprehension, worry, solidarity and human pity. The latter (e.g. the case of ILVA, the Taranto-based steelmaker) stir up anger and hostility. This is because environmental and technological disasters can be prevented, and a desire emerges soon after these episodes to seek out those who hold legal and political responsibilities.

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In light of the above, this paper sets out to evaluate the reliability of the firmly established¹ distinction between natural disasters², and environmental and technological ones³, focusing on the consequences relating to labour law and industrial relations. Due to the unpredictability of natural disasters, welfare systems traditionally support the victims and the areas affected through temporary and emergency interventions (*infra*, § 3). On the contrary, environmental and technological hazards are deemed preventable, therefore legal authorities are usually tasked with establishing their causes and determining penal, administrative or civil sanctions for those responsible⁴.

The question arising from the foregoing considerations and which this paper⁵ seeks to answer is whether labour law, industrial relations and welfare systems can provide a contribution to the prevention and the proactive management of disasters. This contribution should consider the impact that these events have on people, production, incomes and employment rates.

As is widely acknowledged - also among employers and trade unions - technological and environmental disasters are ascribed to human behavior,

(¹) See, among others, D. VENN, *Helping Displaced Workers Back Into Jobs After a Natural Disaster. Recent Experience in OECD Countries*, OECD Social, Employment and Migration Working Paper, 2012, n. 142, p. 2, who speaks of «the unpredictable character of natural disasters».

(²) According to a widely accepted definition in literature, “natural disasters” are events occurring in the surrounding environment that are harmful to people and are caused by forces beyond human control. In this sense, see I. BURTON, R.W. KATES, *Perception of Natural Hazards in Resource Management*, in *Natural Resources Journal*, 1964, vol. 3, n. 3, p. 413, and I. BURTON, R.W. KATES, G.F. WHITE, *The Environment as Hazard*, Oxford University Press, 1978. The International Disaster Database of the Centre for Research on the Epidemiology Disasters classifies natural disasters considering the following subgroups: geophysical, meteorological, hydrological, climatological and biological disasters. See D. GUHA-SAPIR, P. HOYOIS, R. BELOW, *Annual Disaster Statistical Review 2012. The Numbers and Trends*, CRED, 2013, who provide detailed information on the number, scope and impact of natural disasters recorded in the last ten years and in 2012, considering the foregoing classification.

(³) Conversely, “environmental disasters” are man-made events that have an impact on the environment (pollution, chemical contamination and industrial accidents). See again I. BURTON, R.W. KATES, G.F. WHITE, *op. cit.* The International Disaster Database regards these events as “technological disasters”, which also include industrial accidents (www.emdat.be/explanatory-notes).

(⁴) Among the many contributions in G. ALPA, G. CONTE, V. DI GREGORIO, A. FUSARO, U. PERFETTI (a cura di), *Rischio di impresa e tutela dell'ambiente*, ESI, 2012, see I.A. NICOTRA, U. SALANITRO (a cura di), *Il danno ambientale tra prevenzione e riparazione*, Giappichelli, 2010. A theoretical and conceptual framework of the current notion of “responsibility” is provided in H. JONAS, *Il principio responsabilità. Un'etica per la civiltà tecnologica*, Einaudi, 1990, e U. BECK, *La società del rischio. Verso una seconda modernità*, Carocci, 2000.

(⁵) To date, no contribution has been reported in Italian labour law and industrial relations literature that discusses the issues at hand.

meaning that responsibility and culpability can be legally determined⁶. The same cannot be said of natural disasters, which due to their unpredictability, are the result of mere chance. This is certainly true for one-off events, for scientific knowledge and research do not allow us to predict where, how, and when natural disasters will occur. Yet this assumption can be questioned if a long-term perspective is taken⁷.

We are aware that some areas are more likely to experience natural disasters than others are. We also know that productive and industrial activities performed in disaster-prone areas might trigger technological accidents,⁸ e.g. toxic gas emissions and liquid spills. An example of this is the March 2011 Fukushima nuclear disaster that was provoked by an earthquake and a tsunami. From the Industrial Revolution onwards, it is human behavior that increases, if indirectly, the likelihood of both natural and environmental disasters, by exploiting natural resources to develop and profit from productive activity⁽⁹⁾. Technological innovation, demographic changes, social developments and economic activity have a major impact on the surrounding environment and

(6) See Directive 2004/35/EC that draws on the measures already laid down in the 2000 White Paper on Environmental Liability and makes a distinction between strict liability (damage caused by dangerous activity) and negligence (damage produced to biodiversity by non-dangerous activity).

(7) Albeit innovative, the critical perspective adopted in this paper has sound basis, as the international literature has recently highlighted the scant consideration given by economists to the prevention of natural disasters. This is even truer for labour lawyers and industrial relations scholars, who have never approached this issues for the reasons explained here. See, for all, T. BANG VU, D. HAMMES, *Dustbowls and High Water, the Economic Impact of Natural Disaster in China*, in *Asia-Pacific Journal of Social Sciences*, 2010, n. 1, special issue. Significantly, on p. 122 it is argued that «Research in both the social and natural sciences has been devoted to increasing our ability to predict, prepare for, and mitigate the costs of disasters. Curiously, despite the death, dislocation, and direct damage caused by natural disasters, few economists participate in developing this agenda. Nor have many attempted to answer the many economically relevant questions relating to natural disaster». In a similar vein, see E. CAVALLO, I. NOY, *Natural Disasters and the Economy – A Survey*, in *International Review of Environmental and Resource Economics*, 2011, vol. 5, n. 1.

(8) The expression “natech disasters” is usually employed in literature to refer to technological and environmental accidents sparked by natural events. See E. KRAUSMANN, V. COZZANI, E. SALZANO, E. RENNI, *Industrial Accidents Triggered by Natural hazards: An Emerging Risk Issue*, in *Natural Hazards and Earth System Sciences*, 2011, vol. 11, n. 3, and the bibliography therein.

(9) See also the *Report on the Hydrocarbon Exploration and Seismicity in Emilia Region* submitted on February 2014 from the Technical-Scientific Commission that was appointed on 11 December 2011 by the Head of the Department of Civil Protection of the Presidency of Council of Ministers, for evaluating the possible relationships between hydrocarbon exploration and a marked increase of seismicity in the Emilia Romagna area following the 2012 earthquakes. On p. 190 it is stressed that “Several authoritative reports describe well-studied cases where extraction and/or injection of fluids in hydrocarbon or geothermal fields has been associated with the occurrence of earthquakes, of magnitudes even higher than 5”.

on some hydro-meteorological and geophysical phenomena. To the extent that the effects of climate change on some natural processes¹⁰ are a widely debated topic among the experts of social and natural sciences who deal with so-called anthropogenic disasters¹¹.

Further, an examination of similar events in the past, along with an analysis of the areas concerned and the type of disaster, might help to predict the consequences of any natural catastrophe related to fatalities, damage to properties, the impact on the economy and the labour market.

According to a recent survey by the European Environmental Agency¹², the number of natural and environmental disasters¹³ in Italy and Europe is on the rise because of several geophysical, socio-economic, and technological changes. Some 576 disasters were reported in Europe in the 1998–2009 period due to natural hazards causing some 100,000 fatalities and €150 billion in overall losses, with serious implications on economic stability and growth. During the same period, more than 11 million people out of a population of some 590 million in the European Environmental Agency member countries were affected by disasters caused by natural hazards. A lack of uniformity can be seen across Europe that concerns the victims of natural disasters. Italy and France reported the highest number of fatalities (20,000 people) followed by Turkey (18,000 people) and Spain (15,000 people). We do not know where, when and how natural disasters will take place. Yet we know that some areas

(¹⁰) *Climate change, impacts and vulnerability in Europe 2012. An indicator-based report*, EEA Report, 2012, n. 12. Cf. also the Communication From the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - an EU Strategy on adaptation to climate change COM(2013)216 def.

(¹¹) Aside from the vast amount of literature on climate change, cf. again the Report on the Hydrocarbon Exploration and Seismicity in Emilia Region carried out by International Commission on Hydrocarbon Exploration and Seismicity. The report pinpoints some seismic events that can be traced to human behaviour, among others anthropogenic, induced and triggered seismicity (p. 8-9; 189-190; 196).

(¹²) *Mapping the impacts of natural hazards and technological accidents in Europe. An overview of the last decade*, EEA Technical report, 2010, n. 13.

(¹³) According to the World Disaster Report of the International Federation of Red Cross and Red Crescent Societies (www.ifrc.org) Asia is still the area that is affected the most by these events, recording 2,900 disasters between 2000 and 2010 (40% of the world's total hazards), involving 2 million people and causing 2 million deaths and damage worth \$386 million. Cf. also M. MILCZAREK (edited by), *Emergency Services: a Literature Review on Occupational Safety and Health Risks*, EU-OSHA, 2011, 15-16. The data from 2012 confirm that Asia is highly prone to natural disasters. 40.7% of the disasters who take place globally occur here, followed by the Americas (22.2%), Europe (18.3%), Africa (15.7%) and Oceania (3.1%). Over the same year, the share of fatalities from natural disasters in Asia was equal to 64.5% of those reported at the global level, that is twice those recorded in Africa (30.4%), which ranks second in this classification. Cf. D. GUHA-SAPIR, P. HOYOIS, R. BELOW, *op. cit.*, 2.

are more likely to experience natural disasters than others are, so their impact on people's lives and security can be mitigated, as can that on employment, income and social protection.

In fact, the expression "natural disasters" is not entirely correct¹⁴ and certainly outdated, for it is inappropriate to describe the events under study in this paper. This is because "human behaviour transforms natural hazards into what should really be called unnatural disasters"¹⁵.

If "natural disasters" are in some respects predictable, and if their direct and indirect consequences on people and things are further worsened by human behavior, it is no longer possible to speak of "mere chance", as is usually done by the media, public opinion and decision-makers. This is a crucial point, as rather than focusing on emergency and extraordinary measures, emphasis must be given to the prevention of the possible consequences on people, local productive systems and labour markets in order to speed up recovery¹⁶. On close inspection, prevention strategies should be given priority also in the event of technological or environmental disasters, which cannot be dealt with only at a later stage through public demonstrations and in court, as the case of Taranto-based ILVA demonstrated¹⁷.

The recent increase¹⁸ in natural disasters and technological and environmental hazards led international institutions¹⁹ and social science experts²⁰ to regard

(14) In these cases, disasters happen only from a human perspective, being them natural processes. Cf. *Mapping the impacts of natural hazards and technological accidents in Europe. An overview of the last decade*, qui 18.

(15) UNITED NATIONS, *Report of the Secretary-General on the work of the Organization*, 1999, A/54/1, 2, point 11. It is argued that «Human communities will always face natural hazards – floods, droughts, storms or earthquakes; but today's disasters are sometimes man-made, and human action – or inaction – exacerbates virtually all of them. The term "natural disaster" has become an increasingly anachronistic misnomer. In reality, human behaviour transforms natural hazards into what should really be called unnatural disasters».

(16) Cf. D. VENN, *op. cit.*, espec. 2, where it is argued that «due to the unpredictable nature of natural disasters, many of the policies implemented by labour ministries in response have been, by necessity, *ad hoc* in nature».

(17) Cf. R. CARAGNANO, M. GIOVANNONE (edited by), *ILVA: le relazioni industriali tra diritto alla salute e diritto al lavoro*, Boll. spec. ADAPT, 22 maggio 2013, n. 13.

(18) Cf. again *Mapping the impacts of natural hazards and technological accidents in Europe. An overview of the last decade*, cit.

(19) Cf. WORLD BANK, *Building Resilient Communities. Risk Management and Response to Natural Disasters through Social Funds and Community-Driven Development Operations*, 2008, and WORLD ECONOMIC FORUM, *Building Resilience to Natural Disasters: A Framework for Private Sector Engagement*, 2008.

(20) Among the many studies hailing the involvement of social sciences to prevent natural disasters considering so-called social resilience, see cf. B. WISNER, P. BLAIKIE, T. CANNON, I. DAVIS, *At Risk. Natural Hazards, People's Vulnerability and Disasters* Routledge, 2004, 11, where vulnerability is defined as «characteristics of a person or group and their situation that

reduced vulnerability as a major aspect in integrated risk management strategies²¹ that might explain their low impact on production and the labour market²².

If this perspective is taken, industrial relations and welfare systems can play a major role in terms of prevention and pro-active management, as can the rules governing the labour market if adapted and thoroughly reviewed. This is exactly what we argue in this paper, especially if one considers that workers can be counted as among the most vulnerable groups, together with the elderly, children, people with disabilities and migrants²³.

Natural disasters are still investigated taking account of geophysical risks and their management through hierarchical and mandatory provisions intended to look for the best technological solution²⁴.

Instead, the “vulnerability” perspective is based on disasters and on their socio-economic, political and cultural determinants²⁵, and prioritizes cooperative and decentralized forms of prevention and risk management.

This is done in an awareness that the most critical issues resulting from natural, technological and environmental disasters concern economic distress and reduced incomes, power inequalities among social groups, different educational levels, limited access to information and education, differences arising from the public systems of social protection²⁶ and the existence of weak affective bonds in the social and productive fabric²⁷. Accordingly, the risks and the

influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard». Cf. also K. WARNER (a cura di), *Perspectives on Social Vulnerability*, United Nations University-Munich Re Foundation Source, 2007, n. 6, and the literature review in A. GALDERISI, F.F. FERRARA, A. CEUDECH, *Resilience and/or Vulnerability: Relationship and Roles in Risk Mitigation Strategies*, 24th AESOP Annual Conference, Helsinki, Finland, 7-10 July 2010, Track 10, *Sustainability: Climate change, risks and planning*.

(²¹) Cf. *Mapping The Impacts of Natural Hazards and Technological Accidents in Europe. An Overview of the Last Decade*, cit., 22.

(²²) Cf., for instance, M.F. MCINTOSH, *Measuring the Labor Market Impacts of Hurricane Katrina Migration: Evidence From Houston, Texas*, in *The American Economic Review*, 2008, vol. 98, n. 2.

(²³) Cf. A. ONO, *Employment of Disaster Victims Supporting the Reconstruction – Emergency Job Creation Program in Emergency Temporary Housing Support*, paper presented at the seminar *The labour market impacts of natural and environmental disasters*, cit.

(²⁴) In a similar vein, see D.S.K. THOMAS, B.D. PHILLIPS, W.E. LOVEKAMP, A. FOTHERGILL, *Social Vulnerability to Disasters*, CRC Press, 2013, 4 (table 1.1) e 5-10.

(²⁵) Ivi, 4 (table 1.1) e 10-20.

(²⁶) Cf. B. WISNER, P. BLAIKIE, T. CANNON, I. DAVIS, *op. cit.*, 5, according to whom «hazard vulnerability is determined by social influences and power and not by the forces of nature». Cf. also T. CANNON, *Vulnerability Analysis and the Explanation of ‘Natural’ Disasters*, in A. VARLEY (edited by), *Disasters, Development and Environment*, Wiley, 1994, and, more recently, D.S.K. THOMAS, B.D. PHILLIPS, W.E. LOVEKAMP, A. FOTHERGILL, *op. cit.*

(²⁷) For this last profile, see H. TOYA, M. SKIDMORE, *Do Natural Disasters Enhance Social Trust?*, CESifo Working Paper, 2013, n. 3905.

consequences of a natural disaster do not only depend on the episode itself, but also on the vulnerability²⁸ and resilience²⁹ of those involved, on whom welfare and industrial relations systems can have a major impact.

2. Natural Disasters and their Consequences on Industry, Incomes, and the Labour Market

The international literature has pointed out that natural disasters have a direct impact on infrastructure and people's lives, causing damage to material and non-material assets. A country's industry, revenues, and labour market dynamics are likewise affected, albeit indirectly.

By way of example, one might recall that the earthquake and the following tsunami that ravaged the Maule region in Chile in February 2010 caused the loss of 90,000 jobs and a 3% decrease in Gross Domestic Product (GDP) in the first four months of 2010³⁰. In a similar vein, the quakes and the tsunami that hit the prefectures of Iwate, Miyagi and Fukushima (Japan) in March 2011 brought about a decrease in the number of employed people (from 2.75 to 2.60 million)³¹. Likewise, the string of earthquakes recorded in Christchurch (New Zealand) between 2010 and 2011 affected the national occupational levels, causing damages to properties and infrastructure worth between 10% and 20% of the country's GDP³². Even when the impact of natural disasters on the national economy is modest, demographic trends³³ might be affected with

(²⁸) Again, B. WISNER, P. BLAIKIE, T. CANNON, I. DAVIS, *op. cit.*, cap. II, who formulate the theory: "Risk (disaster) = Hazard Vulnerability".

(²⁹) Resilience is defined as an adaptation and positive trajectory following a situation of disturbance, disruption or difficulty (cf. F.H. NORRIS, S.P. STEVENS, B. PFEFFERBAUM, K.F. WYCHE, R.L. PFEFFERBAUM, *Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness*, in *American Journal of Community Psychology*, 2008, vol. 41, n. 1, 127) and constitutes «the capacity for successful adaptation, positive functioning or competence [...] despite high-risk status, chronic distress, or following prolonged or severe traumas», cf. B. EGELAND, E. CARLSON, L.A. SROUFE, *Resilience as process*, in *Development and Psychopathology*, 1993, vol. 5, n. 4, 517.

(³⁰) For a detailed analysis, Cf. *El impacto del terremoto sobre el empleo*, Informe de Análisis Económico y Social, Fundación Instituto de Estudios Laborales, FIEL, June 2010. See also J. DRESDNER, K. SEHNBRUCH, *El impacto del sismo 2010 sobre el mercado laboral de la Región del Biobío*, in *Sociedad Hoy*, 2010, n. 19, and UNITED NATIONS, *The Chilean earthquake of 27 February 2010: an overview*, 2010, esp. 12-18.

(³¹) JILPT, *Labor Situation in Japan and Its Analysis: General Overview 2013/2014*, 2014, 12.

(³²) Cf. I. NOY, *The Enduring Economic Aftermath of Natural Catastrophes*, in *Vox*, 5 September 2012, and B. LAYTON, *Impact of Natural Disasters on Production Networks and Urbanization in New Zealand*, ERIA Discussion Paper, 2013, n. 13, 20-24.

(³³) F. SPEROTTI, *Disastri naturali e mercato del lavoro: l'importanza del fattore demografico*, referred to in this paragraph.

serious implications on whole industries and the development of local labour markets. New Orleans is a case in point³⁴: an analysis of the labour market following Hurricane Katrina in 2005 showed that only half of those evacuated (200,000 out of 400,000 people) returned to their homes in the two years subsequent to the disaster³⁵, causing a 35% decrease in the employment rates.³⁶ Ten years earlier, Hurricane Andrew in Florida caused major disruption to 8,000 companies employing 123,000 workers³⁷. In Italy, the 2014 floods in Modena received little media coverage. However, 2,000 workers and 600 companies in the manufacturing and the agriculture sectors were affected, bringing about the temporary suspension of working activities for 5,000 workers³⁸.

Evidently, employment is affected by business closures and interruptions³⁹ – even when involving self-employed workers and other professionals – material damages, disruption from inadequate facilities, delays in energy supply, and problems with the customers hit by the disaster.

Business can shut down on a temporary or permanent basis and determine the relocation of production to other sites regarded as safer or less vulnerable, re-shaping the labour market of disaster-affected areas⁴⁰.

(³⁴) Cf. an overview of the cities that symbolize the positive and negative effects of natural disasters is provided in F. SPEROTTI, *Demografia, economia e parti sociali: i tre fattori per prevenire e attenuare gli effetti dei disastri naturali*, in M. GIOVANNONE, E. GRAZIOLI, S. SPATTINI (a cura di), *Modena: dopo il terremoto l'alluvione. L'impatto delle calamità naturali sul sistema produttivo e sul lavoro*, Boll. spec. ADAPT, 28. Here reference is made to the cases of Chicago, ravaged by the great fire in 1871 and San Francisco, hit by the 1906 earthquake, to point out that human capital and dynamic production can speed up recovery and increase economic and labour market performance. On the contrary, Iwate, Miyagi and Fukushima in Japan reported lower performances due to the March 2011 earthquake and the following tsunami that generated a nuclear disaster, while dealing with a rapid ageing of the population and economic stagnation. Cf. Y. ZHOU, *How Will the 3.11 Earthquake Transform the Population and Labor Market in Iwate, Miyagi and Fukushima? Knowledge Gained from Existing Studies of Disasters*, in *Japan Labor Review*, 2012, vol. 9, n. 4.

(³⁵) Cf. J.A. GROEN, A.E. POLIVKA, *The Effect of Hurricane Katrina on the Labor Market. Outcomes of Evacuees*, in *The American Economic Review*, 2008, vol. 98, n. 2; J. VIGDOR, *The Katrina Effect: Was there a Bright Side to the Evacuation of Greater New Orleans?*, in *The B.E. Journal of Economic Analysis & Policy*, 2007, vol. 7, n. 1; J. ZISSIMOPOULOS, L.A. KAROLY, *Employment and Self-Employment in the Wake of Hurricane Katrina*, in *Demography*, 2007, vol. 47, n. 2.

(³⁶) *Ibidem*.

(³⁷) Cf. J.I. SANCHEZ, W.P. KORBIN, D.M. VISCARRA, *Corporate Support in the Aftermath of a Natural Disaster: Effects on Employee Strains*, in *Academy of Management Journal*, 1995, vol. 38, n. 2, 504.

(³⁸) Cf. M. GIOVANNONE, E. GRAZIOLI, S. SPATTINI (a cura di), *op. cit.*

(³⁹) Cf. D. VENN, *op. cit.*, spec. 13-14.

(⁴⁰) *Ivi*, 14-15.

Of course psychological, emotional and physical factors also need to be considered at the time of resuming work and production. They have a major impact on the workers affected by disasters⁴¹, but also on those involved in first aid (fire brigades, medical staff, ambulance care assistants, police officers and so forth)⁴² and reconstruction (e.g. those in charge of decontamination, engineers and construction workers)⁴³. As one might expect, the most vulnerable groups include women and young people⁴⁴. Migration flows usually follow a natural disaster⁴⁵, along with a significant mismatch between labour supply and demand because of a shortage of the expertise needed for reconstruction (e.g. engineers, bricklayers, electricians, OHS professionals, IT experts)⁴⁶.

Significantly, only a few economists⁴⁷ have attempted to estimate the negative impact of natural disasters on the economy and the labour market in the short

(⁴¹) A.E. JIMÉNEZ, R.A. CUBILLOS, *Estrés Percibido y Satisfacción Laboral después del Terremoto Ocurrido el 27 de Febrero de 2010 en la Zona Centro-Sur de Chile*, in *Terapia Psicológica*, 2010, vol. 28, n. 2, and the bibliography therein.

(⁴²) Cf. M. MILCZAREK (edited by), *op. cit.*

(⁴³) See also ILO, *Public emergency services: Social dialogue in a changing environment*, 2002, 56-65. Cf. also: S.-C. LIAO, M.-B. LEE, Y.J. LEE, T. WENG, F.-Y. SHIH, M.H.M. MA, *Association of psychological distress with psychological factors in rescue workers within two months after a major earthquake*, in *Journal of the Formosan Medical Association*, 2002, vol. 101, n. 3; T. HERING, I. BEERLAGE, *Arbeitsbelastungen und Gesundheit im Rettungsdienst. Aus einer Ressourcen-Perspektive betrachtet*, in *Trauma & Gewalt*, 2007, vol. 1, n. 4; C. KIRCHSTEIGER, *Trends in accidents, disasters and risk sources in Europe*, in *Journal of Loss Prevention in the Process Industries*, 1999, vol. 12, n. 1; C. KOOPMAN, C. CLASSEN, E. CARDENA, D. SPIEGEL, *When disaster strikes, acute stress disorder may follow*, in *Journal of Traumatic Stress*, 1995, vol. 8, n. 1. Sulla esposizione alla contaminazione da sostanze nocive si veda D.K. HORTON, Z. BERKOWITZ, W.E. KAYE, *Secondary contamination of ED personnel from hazardous materials events, 1995-2001*, in *The American Journal of Emergency Medicine*, 2003, vol. 21, n. 3.

(⁴⁴) Cf. E. ENARSON, *Gender and Natural Disasters*, In Focus Programme on Crisis Response and Reconstruction Working Paper, 2000, n. 1, esp. chapter 3. D.A. FARBER, *Disaster Law and Inequality*, in *Law and Inequality*, 2007, vol. 25, n. 2, especially chapter 3. 305-308.

(⁴⁵) Cf. Y. HIGUCI, T. INUI, T. HOSOI, I. TAKABE, A. KAWAKAMI, *The Impact of the Great East Japan Earthquake on the Labor Market – Need to Resolve the Employment Mismatch in the Disaster-Stricken Areas*, in *Japan Labor Review*, 2012, vol. 9, n. 4, espec. 6-10; A. DRABO, L.M. MBAYE, *Climate Change, Natural Disasters and Migration: An Empirical Analysis in Developing Countries*, IZA Discussion Paper, 2011, n. 5927. Migrations following natural disasters can be seen as related to the notion of “environmental migrants” that has been defined by IOM, *Discussion Note: Migration and the Environment*, 1^o November 2007, MC/INF/288, 1.

(⁴⁶) Cf. Y. HIGUCI, T. INUI, T. HOSOI, I. TAKABE, A. KAWAKAMI, *op. cit.*, spec. 10-18. Cf. altresì M. KIRCHBERGER, *Natural Disasters and Labor Markets*, Centre for the Study of African Economies, 2014, e D. VENN, *op. cit.*, 14-15.

(⁴⁷) Among the economic studies aimed at evaluating the consequences of natural disasters on the economy and the labour market, see A.R. BELASEN, S.W. POLACHEK, *How Disasters Affect Local Labor Markets: The Effects of Hurricanes in Florida*, IZA Discussion Paper, 2007, n. 2976; S.

term, but their research outcomes can be questioned in terms of reliability⁴⁸. Even less consideration is given to the consequences of natural hazards in the medium and long term⁴⁹ that might depend on the vulnerability and resilience of those affected, as we have seen in par. 1⁵⁰. Likewise limited is the attention paid to the changes in the occupational levels and the labour market (i.e. remuneration, productivity, working conditions) after natural disasters⁵¹. Therefore, it should come as no surprise that today's measures to aid workers and plants hit by disasters are often piecemeal, temporary and emergency ones⁵².

HOCHRAINER, *Assessing the Macroeconomic Impacts of Natural Disasters. Are there Any?*, World Bank Policy Research Working Paper, 2009, n. 4968; C.R.H. JARAMILLO, J.R. JR. HINES, *The Impact of Large Natural Disasters on National Economies*, 2006; N. LOAYZA, E. OLABERRÍA, J. RIGOLINI, L. CHRISTIAENSEN, *Natural Disasters and Growth. Going beyond the Averages*, World Bank Policy Research Working Paper, 2009, n. 4980; T.N. RASMUSSEN, *Macroeconomic Implications of Natural Disasters in the Caribbean*, IMF Working Paper, 2004, n. 224; E. STROBL, *The Economic Growth Impact of Hurricanes: Evidence from US Coastal Counties*, IZA Discussion Paper, 2008, n. 3619.

⁴⁸ S. HALLEGATTE, V. PRZYLUKI, *The Economics of Natural Disaster. Concepts and Methods*, World Bank Policy Research Working Paper, 2010, n. 5507, argue that the many impact analyses carried out so far have produced contradictory results, for the indicators used in the estimation of the direct and indirect costs of disasters are often unclear. For an evaluation of the macroeconomic impact of natural disasters, see also UNITED NATIONS, *Handbook for Disaster Assessment*, 2014, especially 240-242 for indications concerning the evaluation of the impact on the labour market and earnings.

⁴⁹ Cf. A. POPP, *The Effects of Natural Disasters on Long Run Growth*, in *Major Themes in Economics*, 2006, vol. 8; E. CAVALLO, I. NOY, *The Economics of Natural Disasters – A Survey*, IDB Working Paper, 2010, n. 124; C.-K. KIM, *The Effects of Natural Disasters on Long-Run Economic Growth*, in *Michigan Journal of Business*, 2011, vol. 4, n. 1; M. COFFMAN, I. NOY, *Hurricane Iniki: measuring the long-term economic impact of natural disaster using synthetic control*, in *Environment and Development Economics*, 2011, vol. 17, 187-205.

⁵⁰ The relevant literature shares the view that underdeveloped countries are affected the most by natural disasters. Some 99% of the people hit by natural catastrophes between 1970 and 2008 were based in Latin America, Asia, Africa and the Caribbean. Cf. E. CAVALLO, I. NOY, *The Economics of Natural Disasters – A Survey*, cit., 11

⁵¹ Among the few contributions on this subject, see: S. JAYACHANDRAN, *Selling Labor Low: Wage Responses to Productivity Shocks in Developing Countries*, in *Journal of Political Economy*, 2006, vol. 114, n. 3; B. LAYTON, *op. cit.*; M. ANDO, *Impact of Recent Crises and Disasters on Regional Production/Distribution Networks and Trade in Japan*, ERIA Discussion Paper, 2013, n. 12; L.D. TRUNG, *Economic and Welfare Impacts of Disasters in East Asia and Policy Responses: The Case of Vietnam*, ERIA Discussion Paper, 2013, n. 11; S. VATHANA, S. OUM, P. KAN, C. CHERVIER, *Impact of Disasters and Role of Social Protection in Natural Disaster Risk Management in Cambodia*, ERIA Discussion Paper, 2013, n. 10; V. MUELLER, A. QUISUMBING, *How Resilient are Labour Markets to Natural Disasters? The Case of the 1998 Bangladesh Flood*, in *The Journal of Development Studies*, 2011, vol. 47, n. 12.

⁵² Among the rare contributions on the topic, see D. VENN, *op. cit.*, spec. 15-16.

3. The Passive Approach of Public Welfare

According to our comparative analysis, the complex set of initiatives in place to support those affected by natural disasters might depend on the welfare system of each country surveyed. However, a gradual convergence emerges towards the provision of social protection⁵³. In legal terms, natural disasters can be regarded as “unforeseeable circumstances or force majeure”⁵⁴. For this reason, the legislation of some countries (e.g. Italy) makes provision for the suspension of tax obligations and social security contributions⁵⁵. While maintaining their jobs, the workers affected by natural disasters are also entitled to time off from work and, in some cases, income support⁵⁶. In other countries, for example in Australia, New Zealand, Turkey and the USA, no measures are in place to reduce or temporarily suspend one’s working activity, yet ordinary and extraordinary⁵⁷ unemployment benefits are granted, and complex entitlement procedures are exceptionally streamlined by acting on duration and eligibility criteria (Chile’s and Japan’s case). This second group of countries might also

(⁵³) In relation to anti-crisis measures, see S. SPATTINI, M. TIRABOSCHI, *Labor Market Measures in the Crisis and the Convergence of Social Models*, in L.D. APPELBAUM (a cura di), *Reconnecting to Work. Policies to Mitigate Long-Term Unemployment and Its Consequences*, W.E. Upjohn Institute for Employment Research, 2012, 137-166.

(⁵⁴) By way of example, Cf. Gobierno de Chile, Dirección del Trabajo, ord. 19 marzo 2010, n. 1412/021, in www.dt.gob.cl/1601/w3-article-97663.html, e BCN, *Derechos laborales ante catástrofes naturales*, April 2014, in www.bcn.cl. Pursuant to the Chilean Civil and Labour Codes, earthquakes, tsunamis, floods and hurricanes are unforeseeable circumstances that fall outside the notion of work accidents. Consequently, workers can be dismissed without any compensation for early termination.

(⁵⁵) This measure has a wide scope of application.

(⁵⁶) With reference to the Italian case, see M. TIRABOSCHI (a cura di), *Managing and Preventing Natural (and Environmental) Disasters: The Role of Industrial Relations. Some Reflections on the Italian Case*, Working Paper ADAPT, 2013, n. 142. A detailed list of the measures in place in Italy in the event of an earthquake is provided in la *Nota informativa sulle prime misure regionali e nazionali a favore delle popolazioni colpite dal sisma della Regione Emilia Romagna*, 2012, which contains a summary of Decree-Law No. 74/2012, *Interventi urgenti in favore delle popolazioni colpite dagli eventi sismici che hanno interessato il territorio delle province di Bologna, Modena, Ferrara, Mantova, Reggio Emilia e Rovigo, il 20 e il 29 maggio 2012* subsequently amended, converted into Act No. 122/2012, and published in GU, 3 agosto 2012, n. 180 and of other regional, national and European initiatives in force since 13 June 2012.

(⁵⁷) An example of this is the Disaster Unemployment Assistance (DUA), a fund supporting those who are not, or no longer, eligible for unemployment benefits. DUA provides a 26-week benefit that can be extended depending on the circumstances and the seriousness of the situation, as was the case with Hurricane Katrina. Cf. workforcesecurity.doleta.gov/unemploy/disaster.asp. With special reference to measures supporting employment in case of damages caused by hurricanes, cf. INTERNATIONAL HUMAN RIGHTS LAW CLINIC, *When Disaster Strikes: A Human Rights Analysis of the 2005 Gulf Coast Hurricanes*, 2006, especially 40-43.

envisage extraordinary forms of income support to prevent workers' dismissal⁵⁸. Further measures concern placement services for workers who have lost their job following a natural disaster, along with special job creation programmes, tax incentives and engagement in community service⁵⁹. The effectiveness of these measures relies on the financial resources available, the matching between labour demand and supply⁶⁰ in the private and public sector, the quality of training and retraining programmes and ultimately on their compatibility with income support policies according to eligibility criteria. There is a serious concern that overly generous benefit systems might act as a disincentive to job searching and favour the growth of the informal economy in disaster-prone areas.

Although laudable, many policies concerning income and employment support show some major shortcomings that are ascribed to their passive approach and the lack of risk management strategies⁶¹. In other words, they do not consider human error – for example when building facilities and choosing production – nor do they promote the involvement and the empowerment of workers, employers and their representatives on these aspects. In keeping with the idea that natural disasters are the result of unforeseeable events, the foregoing initiatives fail to consider the need to limit those risks that might produce a veritable natural hazard⁶².

The same argument can be made for the piecemeal measures devised following a natural disaster and intended to promote employment and reconstruction in the affected areas⁶³. Not only do they report low levels of effectiveness and financial sustainability⁶⁴, but they also show certain limitations, as they are

(⁵⁸) Still with reference to Australia, Chile, Japan, New Zealand and Turkey, cf. D. VENN, *op. cit.*, 17.

(⁵⁹) p. 18-19.

(⁶⁰) The efficiency of the matching system can be undermined by the impact of natural disasters that can smash the buildings hosting public employment services and private work agencies. This might make it difficult to provide information about the eligibility for subsidies to those who have lost their houses and cannot be reached easily, putting a strain on public services, which are unable to identify those who qualify for placement and training programmes. A considerable number of case studies are available in D. VENN, *op. cit.*, 20-22.

(⁶¹) On this topic see L. PELHAM, E. CLAY, T. BRAUNHOLZ, *Natural Disasters: What is the Role for Social Safety Nets?*, World Bank SP Discussion Paper, 2011, n. 1102, especially page 14, where social protection measure are said to be important aspects also in terms of prevention.

(⁶²) p. 23.

(⁶³) For a series of case studies, see D. VENN, *op. cit.*, 20-22.

(⁶⁴) See in particular Chapter III, *Public finance and disasters*, di C. BENSON, E. CLAY, *Economic and Financial Impacts of Natural Disasters: an Assessment of Their Effects and Options for Mitigation: Synthesis Report*, Overseas Development Institute, 2003, 35-54.

emergency measures imposed from on high without envisaging any prevention plan or link with local communities⁶⁵.

4. Occupational Health and Safety Legislation: Current Shortcomings

In some respects, the prevention issues discussed above can be also found in the occupational health and safety (OHS) system, which according to the relevant literature should consider specific types of risks⁶⁶. In Europe, OHS initiatives build on two main principles: prevention and safety, with the latter that should be ensured to the maximum extent possible in technological terms. No special legislation at a European level focuses on natural and environmental disasters. It is the EU directives concerning OHS that lay down the organizational and technical strategies to tackle these events. An example of this is the Workplace Health and Safety Directive 89/391/EEC⁶⁷, which lists a set of guidelines that also address the issues under examination in this paper:

- avoiding risks;
- evaluating the risks;
- combating the risks at source;
- adapting the work to the individual;
- adapting to technical progress;
- replacing the dangerous by those less dangerous;
- developing a coherent overall prevention policy;
- prioritizing collective protective measures (over individual protective measures);

⁽⁶⁵⁾ It might be important to point out the positive experience of the United Nations Development Program (UNDP), and its cooperation with the private sector and the local communities following the Haiti earthquake of 12 January 2010, as it has been described by UNDP in *Haiti Rebuilds*, 2011.

⁽⁶⁶⁾ A general overview of the health and safety risks faced by workers in the event of disasters and emergencies is provided in M. MILCZAREK (a cura di), *op. cit.* More detailed information concerning the impact of disasters on workers' and people's health and safety is provided in the papers presented at the seminar *The labour market impacts of natural and environmental disasters*, especially H. YOSHIDA, *Results of an Analysis of Personal Questionnaire Surveys on the Great East Japan Earthquake: Income, workplace, daily living, and health*, and S. UMEZAWA, *The Great East Japan Earthquake: Its Damages, Impacts on the Labor-economy and Restoration Measures of the Government*.

⁽⁶⁷⁾ Cf. Article 6 of Directive 89/391/EEC of 12 June 1989 concerning the implementation of measures necessary for the safety and health protection of workers at the workplace. For a recent analysis concerning the evolution of European occupational health and safety and the principles laid down in the directive, cf. L. ANGELINI, *La sicurezza del lavoro nell'ordinamento europeo*, Working Paper di Olympus, 2013, n. 29.

- giving appropriate instructions to the workers.

The framework directive has long since been implemented by EU Member States⁶⁸ and lays down a series of obligations for both employers and employees. These duties involve all industries and have many practical implications on the prevention and management of ordinary and extraordinary emergency situations resulting from natural and environmental disasters. Examples include the obligation to establish prevention and protective measures⁶⁹ to promote individual and collective protection⁷⁰, to inform and train workers on the general and specific risks related to their working activity and on protection equipment⁷¹. Regarding the management of emergencies, workers are under the obligation to take the necessary measures for first aid, fire-fighting and evacuation of workers to be adopted in the event of imminent danger⁷². Further, they must also arrange any necessary contacts with external services, particularly as regards first aid, emergency medical care, rescue work and fire-fighting⁷³. In case of serious or imminent dangers, employers must also:

a) as soon as possible, inform all workers who are, or may be, exposed to serious and imminent danger of the risk involved and of the steps taken or to be taken as regards protection;

(⁶⁸) For an institutional analysis of the implementation of Directive 89/391/EEC, cf. Communication (COM [2004] 62) of the Commission on the practical implementation of the provisions of directive 89/391 EEC (framework directive), 89/654 EEC (workplaces), 89/655 EEC (work equipment), 89/656 EEC (personal protective equipment), 90/269 EEC (manual handling of loads) and 90/270 EEC (display screen equipment). Regarding the overall structure of the directive and its impact in Member States, cf. the comparative analysis of J.E. KINEKE, *The EEC Framework Directive for Health and Safety at Work*, in *Boston College International and Comparative Law Review*, 1991, vol. 14, n. 1, 213 and following. On the implementation strategies and issues in Member States, see the comparison provided in L. VOGEL, *Prevention at the workplace. An initial review of how the 1989 Community Framework Directive is being implemented*, European Trade Union Technical Bureau for Health and Safety, 1993. Another comparison is supplied in B. VALDÉS DE LA VEGA, *Occupational Health and Safety: An EU Law Perspective*, in E. ALES (edited by), *Health and Safety At Work. European and Comparative Perspective*, Kluwer Law International, 2013, 1, and *Seminario internazionale di Diritto comparato del lavoro – Pontignano XXVII*, in AA.VV., *Il diritto del lavoro nel sistema giuridico privatistico. Atti delle giornate di studio di diritto del lavoro. Parma, 4-5 giugno 2010*, Giuffrè, 2011, 356.

(⁶⁹) Cf. Art. 7 of Directive 89/391/EEC.

(⁷⁰) Cf. Art. 8 of Directive 89/391/EEC.

(⁷¹) Articles 10 e 12 of Directive 89/391/EEC.

(⁷²) Article 8 of Directive 89/391/EEC.

(⁷³) Cf. Art. 8 of Directive 89/391/EEC.

- b) take action and give instructions to enable workers in the event of serious, imminent and unavoidable danger to stop work and/or immediately to leave the workplace and proceed to a place of safety;
- c) save in exceptional cases for reasons duly substantiated, refrain from asking workers to resume work in a working situation where there is still a possibility of serious and imminent danger.

Conversely, workers who, in the event of serious, imminent and unavoidable danger, leave their workstation and/or a dangerous area may not be placed at any disadvantage because of their action and must be protected against any harmful and unjustified consequences, in accordance with national laws and/or practices⁷⁴. Overall, one might argue that the radical change imposed by EU legislation represents a move away from the technology-based approach to promote prevention, paving the way to occupational health and safety policies centered on workers, active involvement and social dialogue.

It should be pointed out that, unlike other countries⁷⁵, the Italian provisions transposing EU norms do not deal with the management of daily and emergency risks intended to reduce the impact of natural, technological and environmental disasters.

In the absence of a comprehensive set of rules at the European level, special reference should be made to the four Seveso Directives that have been long regulating the issue of industrial plants exposed to so-called “relevant accident risks”⁽⁷⁶⁾. These four directives were issued following a number of industrial accidents occurred in Europe, particularly the 1976 Seveso disaster involving ICMESA, a chemical plant based in Italy. According to the directives, it is down to Member States to set forth protection measures supplementing the ones discussed above that have a more general character.

Initially implemented only in certain industries, these safeguards were extended to all those sectors that might be potentially affected by similar industrial accidents. Examples include a major emission, fire or explosion resulting from uncontrolled developments in the course of an industrial activity, leading to a

⁽⁷⁴⁾ Art. 8 of Directive 89/391/EEC.

⁽⁷⁵⁾ Cf., current legislation in Japan – a country with many disaster-prone areas – and particularly the latest version of the 1972 *Safety and Health Act*. Cf. the documentation collected on the website of the Japan International Center for Occupational Health and Safety, www.jniosh.co.jp.

⁽⁷⁶⁾ Cf. Directive 82/501/EEC (so-called Seveso Directive); Directive 96/82/EC (so-called Seveso Directive II); Directive 2003/105/EC (so-called Seveso Directive II-*bis*) and Directive 2012/18/EC (known as Seveso Directive III) that will enter into force from 1 June 2015 and will replace the previous three.

serious danger to man, immediate or delayed, inside or outside the establishment, and/or to the environment, and involving one or more dangerous substances⁽⁷⁷⁾. The directives lay down more stringent requirements concerning risk evaluation that add to further obligations on the part of employers to provide information to environmental and public security officers, and additional monitoring and sanctioning mechanisms (e.g. the temporary suspension of production)⁷⁸. The significance of the regulations laid down by these directives cannot be questioned. Nevertheless, their scope of application is limited if compared to the general principles outlined above and is dependent upon some special circumstances concerning certain industrial activities (e.g. the use of dangerous substances that might cause emissions, fires, or explosions). Accordingly, natural disasters and the wider range of environmental and technological ones do not fall within the “special circumstances” referred to above.

Things are slightly different in the USA; the 9/11 attacks⁷⁹ and their consequences on the workers engaged in the rescue operations prompted the US government to review the National Response Plan and develop a *Worker Safety and Health Support Annex*⁸⁰ to protect them and prevent similar risks and possible disasters⁸¹.

Besides the above procedures and formal obligations, the Occupational Safety and Health Administration (OSHA) published documentation and organised training programmes on the prevention and management of occupational health and safety risks resulting from environmental and natural disasters for each industry and hazard. While increasing the levels of resilience of employers and employees facing these disasters, these initiatives provided practical tools

(77) On the Italian perspective, Cf. D. DEL DUCA, M. GIOVANNONE, *Disastri naturali e lavoro: misure prevenzionistiche e di protezione sociale*, che segue in *g. Sezione*.

(78) On the measures laid down by the Seveso Directive, cf. C. KIRCHSTEIGER (edited by), *Risk Assessment and Management in the Context of the Seveso II Directive*, Elsevier, 1998, and N. MITCHISON, G. PAPADAKIS, *Safety Management Systems under Seveso II: Implementation and Assessment*, in *Journal of Loss Prevention in the Process Industries*, 1999, vol. 12, n. 1.

(79) Cf. K.M. WALLINGFORD, E.M. SYNDE, *Occupational Exposures During the World Trade Center Disaster Response*, in *Toxicology and Industrial Health*, 2001, vol. 17, n. 5-10; S.I. BERRIOS-TORRES, J.A. GREENKO, M. PHILLIPS, J.R. MILLER, T. TREADWEL, R.M. IKEDA, *World Trade Center Rescue Worker Injury and Illness Surveillance, New York, 2001*, in *American Journal of Preventive Medicine*, 2003, vol. 25, n. 2, and Various Authors, *Exposure, probable PTSD and lower respiratory illness among World Trade Center Rescue, Recovery and Clean-up workers*, in *Psychological Medicine*, 2012, vol. 42, n. 5.

(80) www.fema.gov/pdf/emergency/nrf/nrf-support-wsh.pdf, 2008.

(81) Cf. M.A. CRANE, D.J. MILEK, Y. GLOBINA, L. SEIFU, P.J. LANDRIGN, *The Lessons of September 11*, in *Industrial Health*, 2011, vol. 49, n. 6, and D.B. REISSMAN, J. HOWARD, *Responder Safety and Health: Preparing for Future Disasters*, in *Mount Sinai Journal of Medicine*, 2008, vol. 75, n. 2.

to prevent them through cooperation between business and public authorities⁸².

Along similar lines, the Centers for Disease Control and Prevention of The National Institute of Occupational Safety and Health (NIOSH) made available on its website papers, recommendations, guidelines and information organized by type of disaster and industry⁸³. One might note that legal formalism and mere compliance with norms usually prevail over integrated risk management at the time of implementing safety and preventive measures. This adds to the low effectiveness of such regulations especially when involving workers in small-sized businesses, atypical workers, those engaged in subcontract work or hired on fixed-term employment contracts.

Not surprisingly, the enormous number of provisions are not swiftly applicable in the event of natural hazards, as the 2011 earthquake and the nuclear disaster of Fukushima clearly demonstrated⁸⁴.

Overstressing technical and engineering aspects led those concerned to disregard another important aspect. As a rule, the prevention and management of the actual risks, not just the potential ones, are not the direct consequence of the interaction between human beings, and technology and safety procedures, but originate from the behaviors of groups⁸⁵ of people that cannot be rationally determined, especially when top-down management, sanctions and monitoring activities are in place.

Overall, OHS legislation fails to properly consider those factors increasing the levels of vulnerability in the “business community” (i.e. people, machinery, equipment and facilities). This should be the actual response of any organization to the different risks (either environmental or natural) that are likely to emerge in dangerous activities, e.g. the production of certain goods and services.

Scant consideration has been given to this issue by the international literature, which however shares the view that the adoption of ad-hoc measures – even where supplemented with specific legislation and innovative technologies – is not sufficient to ensure effective protection, particularly when these incidents

(⁸²) See the ad-hoc section of the OSHA website www.osha.gov/SLTC/emergencypreparedness/index.html.

(⁸³) See the ad-hoc section of the NIOSH website, www.cdc.gov/niosh/topics/emergency.html.

(⁸⁴) Cf. K. MORI, S. TATEISHI, K. HIRAOKA, T. KUBO, R. OKAZAKI, K. SUZUKI, Y. KOBAYASH, K. KOHNO, *How Occupational Health can Contribute in a Disaster and What We should Prepare for the Future. Lessons Learned through Support Activities of a Medical School at the Fukushima Daiichi Nuclear Power Plant in Summer 2011*, in *Journal of Occupational Health*, 2013, vol. 55, n. 1. Cf. also M.R. SIM, *Disaster Response Workers: Are we Doing Enough to Protect Them?*, in *Occupational Environmental Medicine*, 2011, vol. 68, n. 5.

(⁸⁵) On this point, Cf. K. FARA, *How Natural are ‘Natural Disasters’? Vulnerability to Drought of Communal Areas in Southern Namibia*, in *Risk Management*, 2001, vol. 3, n. 3.

affect human rationality. It is thus suggested that practical tools should be devised aimed at preventing rather than managing the effects of these disasters. Such initiatives ought to be fine-tuned by building on past experience⁸⁶ and by involving both workers and management⁸⁷. In this sense, one serious issue is the absence of professionals trained to deal with safety procedures at work during exceptional events like those described in this paper⁸⁸.

5. The Possible Role of Industrial Relations and Local Welfare Systems

The violent earthquake that hit the Emilia Romagna region between May and June 2012 gives us the opportunity to reflect on the role played by industrial relations and labour law in the prevention and management of natural disasters. What was striking about that tragedy was that the fatalities were mostly workers who survived the earthquake but died after returning to work, because of the collapse of the building that was previously declared structurally safe⁸⁹.

This tragedy clearly indicates⁹⁰ some shortcomings of the legal system that is well developed in terms of formal safeguards, but presents some limits concerning their practical implementation and some resistance to incorporate a wider and dynamic notion of “risk”. This is because workers’ safety trumps that of businesses and the area affected. They are still treated as two different domains, yet a more effective dialogue between employers and trade unions to reconcile these two aspects would have perhaps avoided these fatalities.

In this sense, another earthquake that took place in the Umbria region between 1997 and 1998 highlights the major role of the industrial relations system in warding off and dealing with natural disasters. On that occasion, the “Single Insurance Contribution Payment Certificate” (*Documento Unico di Regolarità Contributiva - DURC*) was issued to ensure that only employers who comply

⁽⁸⁶⁾ On the positive outcomes of the strategy based on an analysis of earthquake precursors, Cf. D.L. COOKE, T.R. ROHLER, *Learning from incidents: from normal accidents to high reliability*, in *System Dynamics Review*, 2006, vol. 22, n. 3.

⁽⁸⁷⁾ Cf. R. SCHOUTEN, M.V. CALLAHAN, S. BRYANT, *Community Response to Disaster: The Role of the Workplace*, in *Harvard Review of Psychiatry*, 2004, vol. 12, n. 4.

⁽⁸⁸⁾ Again, see K. MORI, S. TATEISHI, K. HIRAOKA, T. KUBO, R. OKAZAKI, K. SUZUKI, Y. KOBAYASHI, K. KOHNO, *op. cit.*, 9.

⁽⁸⁹⁾ Cf. M. GIOVANNONE, *Calamità naturali e sicurezza dei lavoratori: un binomio che fa tremare*, in E. MASSAGLI, S. SPATTINI, M. TIRABOSCHI (a cura di), *Il mondo del lavoro alla prova del terremoto*, Boll. spec. ADAPT, 4 giugno 2012, n. 15.

⁽⁹⁰⁾ By way of example, one might recall the 1999 earthquakes in Turkey and Taiwan, where thousands of workers passed away because of the employers’ failure to comply with anti-seismic legislation. Cf. T. CANNON, *Reducing People’s Vulnerability to Natural Hazards. Communities and Resilience*, WIDER Research Paper, 2008, n. 34, 7.

with anti-seismic regulations were involved in rebuilding. DURC was created to select compliant employers to be engaged in reconstruction and indirectly safeguard workers and all those operating in the areas hit by the disaster.

Originally an industrial relations practice, DURC was implemented through national legislation⁹¹ and emerged as a major tool against irregular work, especially in those industries where contracting and subcontracting were the norm⁹².

Arguably, national and international institutions and the relevant literature have paid little attention to the prevention and the management of natural disasters from an industrial relations perspective. Notions such as “resilience” and “vulnerability”⁹³ are examined in literature when discussing management and prevention strategies, yet they are not part of a common theoretical framework. Therefore, no practical initiatives can be devised allowing one to move beyond merely theoretical abstractions⁹⁴.

Industrial relations and welfare systems might contribute to emphasizing the role of business communities and strengthening the link between the notions of resilience and vulnerability. On the one hand, they can promote a practical approach to increasing community resilience. On the other hand, they can help tackle people’s vulnerability in the long run, acting on incomes, expertise and social security.

While acknowledging the peculiarities of national industrial relations and welfare systems, the involvement of the social partners, employers and employees in the planning and implementation of prevention, mitigation and reconstruction initiatives might produce significant results, among others:

- 1) increased effectiveness of health and safety rules at the workplace and emergency measures in the event of a natural disaster;
- 2) increased ability to prevent situations of risk⁹⁵ and, after the disaster, to devise initiatives that consider the needs of the industry, the area and the business affected;

⁽⁹¹⁾ Act No. 266/2002 and Legislative Decree 276/2003.

⁽⁹²⁾ On this point, see Cf. K. FARA, *op. cit.*, 47-63.

⁽⁹³⁾ Cf. D. DE SANCTIS, *L’edilizia trasparente. Il Durc contro il sommerso: da un’idea Filca alla riforma Biagi*, Edizioni Lavoro, 2003, and R. BONANNI, *Il contributo alla nascita del DURC il Documento Unico di Regolarità Contributiva*, Guida, 2014.

⁽⁹⁴⁾ In this sense, see Cf. A. GALDERISI, F.F. FERRARA, A. CEUDECH, *op. cit.* Cf. also A. ROSE, *Economic Resilience to Natural and Man-Made Disasters: Multidisciplinary Origins and Contextual Dimensions*, in *Environmental Hazards*, 2007, vol. 7, n. 4, according to whom «due to the heterogeneity of approaches and to the different disciplinary perspectives, the concepts of resilience is in danger of becoming a vacuous buzzword from overuse and ambiguity».

⁽⁹⁵⁾ Cf. UNEP, *Labour and the Environment: A Natural Synergy*, 2007, 8.

- 3) An overall reduction of factors of economic and social vulnerability that affect in important respects the population hit by the disaster;
- 4) An increase in the levels of resilience in a given area or at the individual level, by involving existing firms and facilities. In this sense, the network of businesses operating in the disaster-affected area should provide professional and managerial expertise, promoting reconstruction in financial, logistic, and technological terms⁹⁶;
- 5) A genuine contribution to reconstruction, through the implementation of job-creation policies and the pro-active management of the mismatch of labour demand and supply following the natural disaster, also taking into account other aspects (e.g. remuneration).
- 6) The responsible management of social protection and welfare measures, which might take place also through decentralization, as demanded of international institutions.⁹⁷

Not surprisingly, the effectiveness of welfare systems has been questioned also in consideration of the increasing number of natural disasters caused by human behavior and climate change. The discussion concerns the impact of disasters on public expenditure and calls for the involvement of private insurance companies and semi-public institutions, along the lines of what happened⁹⁸ in other pension and social security systems⁹⁹. This is the perspective adopted by some international institutions, among others the International Monetary Fund¹⁰⁰, the World Bank¹⁰¹, the OECD¹⁰², and the European Union, which has

⁽⁹⁶⁾ See the empirical study carried out by J.I. SANCHEZ, W.P. KORBIN, D.M. VISCARRA, *op. cit.*, that is one of the few contributions providing some insight into this issue.

⁽⁹⁷⁾ Cf. L. PELHAM, E. CLAY, T. BRAUNHOLZ, *op. cit.*, especially 99. Cf. also T. CANNON, *Reducing People's Vulnerability to Natural Hazards. Communities and Resilience*, cit.

⁽⁹⁸⁾ Cf. M. MELECKY, C. RADDATZ, *How do Governments Respond after Catastrophes? Natural-Disaster Shocks and the Fiscal Stance*, World Bank Policy Research Working Paper, 2011, n. 5564, and J.D. POLLNER, *Catastrophe Risk Management. Using Alternative Risk Financing and Insurance Pooling Mechanisms*, World Bank Policy Research Working Paper, 2001, n. 2560.

⁽⁹⁹⁾ In this perspective, Cf. A. COVIELLO, *Calamità naturali e coperture assicurative. Il risk management nel governo dei rischi catastrofali*, Dario Flaccovio, 2013.

⁽¹⁰⁰⁾ In this sense, see D. HOFMAN, P. BRUKOFF, *Insuring Public Finances Against Natural Disasters – A Survey of Options and Recent Initiatives*, IMF Working Paper, 2006, n. 199.

⁽¹⁰¹⁾ In this sense, see F. GHESQUIERE, O. MAHUL, *Financial Protection of the State against Natural Disasters. A Primer*, World Bank Policy Research Working Paper, 2010, n. 5429.

recently issued the Green Paper on the Insurance of Natural and Man-made Disasters¹⁰³.

Although limited in number, some Italian cases are noteworthy, especially because of the involvement of certain joint systems known as “bilateral bodies” that provide social protection and income support while putting forward specific measures to mitigate the impact of a natural disaster¹⁰⁴. By way of example, it is worth recalling the agreement concluded by the bilateral bodies of Confesercenti and Unicredit operating at a national level, by virtue of which the employers and the employees affected by the 2012 earthquake in Emilia Romagna had access to funds at favorable conditions to financially help them to resume work. Specifically, the agreement provides 12-month interest-free loan schemes with no arrangement fees that will be paid off in a single payment by the bilateral bodies of Confesercenti.

Still examining the 2012 earthquake in the Emilia Romagna region, the Italian institution Fondartigianato, (which includes the Interprofessional Fund for lifelong learning set up by Confartigianato, Can, Casartigiani, Claii, Cgil, Cisl and Uil) in September 2012¹⁰⁵ allocated €1.700.000 to devise specific training in disaster-affected areas according to a document issued by the Head of Department of the Italian Civil Protection appended to Decree-Law No. 74/2012. This initiative intends to fulfill a number of objectives:

- support the resumption of business activity and promote the importance of lifelong learning especially in small and medium-sized firms;
- strengthen the levels of expertise and competitiveness of businesses to promote local development and that of specific industries and production;
- create employment opportunities and promote human capital. The intention is to prioritize vocational training in order to form staff specialized in the restoration and maintenance of production sites and architectural and artistic

(102) Cf. OECD Recommendation, *Good practices for mitigating and financing catastrophic risks*, 16 dicembre 2010; OECD, *Disaster Risk Assessment and Risk Financing. A G20/OECD Methodological Framework*, 2012.

(103) EUROPEAN COMMISSION, *Green Paper on the insurance of natural and man-made disasters*, 16 April 2013, COM(2013)213 final. Cf. S. MACCAFERRI, F. CARIBONI, F. CAMPOLONGO, *Natural Catastrophes: Risk relevance and Insurance Coverage in the EU*, JRC Scientific and Technical Report, Publications Office of the European Union, 2012.

(104) Cf. again M. TIRABOSCHI (edited by), *op. cit.*

(105) Cf. FONDARTIGIANATO, *Invito per la realizzazione di attività di formazione continua per la ripresa economica e produttiva delle zone colpite dal sisma del maggio 2012*, 2012.

complexes, so as to produce high-impact and innovative processes and products;

- widen the base of training recipients and increase the activity of the Fund especially in emergency situations resulting from the earthquake.

More to the point, in the event of suspension of work resulting from exceptional weather conditions or natural disasters, the Lazio-based bilateral body for artisans provides a wage subsidy amounting to 40% of the net hourly rate for the first 4 weeks up to a maximum of 160 hours per year.

Also, the bilateral bodies in Varese provide a one-off contribution for employers who have incurred expenses as a result of the damages caused by exceptional events and arising from “natural causes” that brought about a partial or total suspension of production in the six months following the event. This money is intended to help to immediately resume the production cycle and to make up for damages caused to property, plants, equipment, materials and products. A subsidy is granted up to a maximum of €1,000,00.

The bilateral body of the Artisan Sector of Tuscany has allocated €1,200,00 to support an emergency intervention in favour of businesses and self-employed artisans affected by the floods that have plagued many areas in the municipalities of Grosseto, Massa Carrara, Lucca and Siena. In addition, a further €300,000 were allocated at the initiative of trade unions CGIL, CISL and UIL for interventions in favor of employees of small-sized businesses affected by the flooding.

Clearly, the development of bilateralism can only be positively evaluated as an out-of-company channel of communication favouring consultation and participation at the workplace – ensuring an immediate response to crises, and enabling medium to long-term solutions to events that may affect workplace safety as well as labour market stability in the afflicted areas.

Finally, the industrial relations system can help to cast light on the consequences that climate change and the increasing number of natural disasters might have on employment. An example of this is the plan devised in Italy by Cgil to tackle the disturbances of the hydrological cycle. The objective is to envisage effective land management initiatives to limit the number of fatalities and the damages to houses and businesses resulting from floods and landslides, while training skilled workers and providing them with stable employment ⁽¹⁰⁶⁾.

⁽¹⁰⁶⁾ An overview of the plan is available at www.cgil.it/Archivio/Ambiente-Territorio/SicurezzaAmbientale/Sintesi_reports.pdf.

6. The Central Role of Labour Market Institutions in Mitigation and Reconstruction Strategies: Conversion of Production and Workers' Retraining

In par. 2 reference has been made to the mismatch between labour supply and demand following a natural disaster. This involves either the need for a qualified workforce to be employed in post-disasters activities or contractual and pay conditions, more generally. While the latter are dependent upon the characteristics of national industrial relations systems (see par. 5), the former rest on the promotion of mitigation and reconstruction strategies on the part of labour market institutions.

Aside from causing fatalities, natural and environmental disasters have serious economic consequences, either in terms of direct costs (e.g. rebuilding) or indirect costs (e.g. a lower contribution to the economy and the production of goods and services, the suspension of activity following the earthquake, and a loss of production during reconstruction).

The strategies to mitigate the effects of natural disasters might give rise to production reconversion in the direction of environmental sustainability (e.g. the green economy)¹⁰⁷ – which might contribute to creating new productive processes and retraining workers. In this sense, the notion of “ecological conversion” is making inroads in Italy and elsewhere as a process to help to overcome environmental issues, namely climatic changes, droughts, water shortages, resource depletion, and natural disasters. Arguably, this process will also boost employment, favouring the hiring of new personnel and disseminating technical skills¹⁰⁸.

Post-disaster reconstruction can favour this ecological conversion through the establishment of renewable energy plants (wind energy, solar energy, geothermic energy, biomass energy, water energy and so forth), the provision of mechanical and electronic tools to promote efficiency in the use of energy, the recourse to sustainable and shared methods of transport and systems of resource recovery (waste recycling). Further benefits include developing the know-how to protect and regenerate the areas affected, promoting environmental-friendly farming for which high-qualified workers are needed, as well as restoring decommissioned facilities¹⁰⁹ and providing technical and maintenance skills to make full use of goods, also by means of informative

⁽¹⁰⁷⁾ Cf. L. RUSTICO, M. TIRABOSCHI, *Le prospettive occupazionali della green economy tra mito e realtà*, in *Rivista*, 2010, n. 4, and the bibliography therein. Cf. also UNEP, *op. cit.*

⁽¹⁰⁸⁾ Cf. M. SCOTT, *Climate Change: Implications for Employment*, ETUI, 2014.

⁽¹⁰⁹⁾ An example of this is Rutgers University that was awarded funding to conduct sustainable reconstruction in 54 towns in the Raritan river Basin. Cf. www.doi.gov/hurricanesandy/index.cfm.

initiatives. Through recycling, the lifecycle of numerous goods and items can be rescheduled in order to recoup efficiency in terms of resources and energy. A shortening of the productive cycle (involving raw materials, transformation, manufacturing, and the use of final product) could decrease energy waste and minimize the impact on environment. It is not a coincidence that a rise has been reported in green jobs, that is in “those occupations that contribute to a large extent to preserving or restoring the quality of environment in agriculture, industry, services or administration”¹¹⁰. The green economy can affect different sectors and aspects in our lives (transport, renewables, communications, finance, waste management, agriculture), with important implications on the labour market.

Identifying new occupations and reviewing existing ones considering an ecological perspective call for different and more defined skills that are closely related to the organisation and different stages of production. Once these new professions are defined, a qualitative evaluation is necessary concerning aspects such as work organisation, remuneration, and professional growth considering emerging factors like health and safety issues, therefore ensuring that any *green job* will also be a *decent job*¹¹¹.

In order to generate new green jobs and make existing ones more sustainable in different industries, it is pivotal to fill the skills gap concerning the green economy that hampers technological progress and sustainable behavior, concurrently promoting carbon low emission strategies.

Arguably, inadequate competences and the disregard for the foregoing issues on the part of many industrial relations actors can be seen as the underlying causes of a vicious cycle of low productivity and incomes that excludes workers from active participation in economic and growth.

7. The Qualification System for Businesses and the Prevention of Risks related to Natural, Environmental and Technological Disasters: Considerations and Future Prospects

The “Single Insurance Contribution Payment Certificate” (DURC)¹¹² laid down by Italian legislation brings to the fore the major role of industrial relations and labour law in preventing and mitigating the impact of natural disasters. Through DURC, a special mechanism has been introduced to select the businesses allowed to operate in certain key markets (construction, transports,

⁽¹¹⁰⁾ Cf. WORLDWATCH INSTITUTE, *Green Jobs: Towards decent work in a sustainable, low-carbon world*, UNEP, 2008, 3.

⁽¹¹¹⁾ p. 4.

⁽¹¹²⁾ *Supra*, § 5. Cf. D. DEL DUCA, M. GIOVANNONE, *op. cit.*

sterilization services for hotels and hospitals, and so forth), in consideration of the main environmental issues and the occupational health and safety of those workers involved in these activities. This is the rationale behind the idea of “a qualification system for employers and self-employed workers”¹¹³, a regulatory tool which at first addressed only public works contracts¹¹⁴, and then it was enhanced and reviewed to ensure occupational health and safety as dictated by the 2008 Consolidated Act, especially in light of the amendments made in 2009¹¹⁵.

This system is in keeping with the idea to promote the resilience and reduce the vulnerability of local communities. This should take place through the active involvement of employers¹¹⁶, and the provision of social protection and support for most vulnerable groups. In this sense, the businesses allowed to operate in certain markets are selected considering the recommendation of joint bodies, the possession of required expertise, the implementation of certified training, and contractual and organizational standards, also in flexible forms of work¹¹⁷.

The qualification system for businesses and employers might become a connecting link between theory and practice, helping to implement resilience initiatives and tackling vulnerability through the creation of infrastructure especially in disaster-prone areas. Similar measures might include the establishment of a wide network of technology and professional institutions in order to avoid that the initiative laid down in rules and preventive plans remain on paper.

In defining the concept of resilience, the literature has long made the point that this notion is in many respects similar to that of “capacity”¹¹⁸, for it refers to aspects like expertise, training and professionalism that also characterize the qualification system for businesses and workers laid down in the Consolidation

(¹¹³) Cf. M. TIRABOSCHI, *Il sistema di qualificazione delle imprese e dei lavoratori autonomi*, in M. TIRABOSCHI, L. FANTINI (a cura di), *Il Testo Unico della salute e sicurezza sul lavoro dopo il correttivo (d.lgs. n. 106/2009). Commentario al decreto legislativo n. 81/2008 come modificato e integrato dal decreto legislativo n. 106/2009*, Giuffrè, 2009.

(¹¹⁴) This also concerned the certification, supervision and verification procedures introduced by Law No. 109 of 1994 and Legislative Decree No. 163 of 2006, as amended and supplemented by Legislative Decree No. 152 of 2008 laying down the Code of public works contracts, public supply contracts, and public service contracts implementing Directives No. 2004/17/EC and No. 2004/18/EC.

(¹¹⁵) Legislative Decree n. 106/2009, amending Legislative Decree n. 81/2008.

(¹¹⁶) Cf. T. CANNON, *Reducing People's Vulnerability to Natural Hazards. Communities and Resilience*, cit.

(¹¹⁷) According to Title VIII, par. I of Legislative Decree No. 276/2003.

(¹¹⁸) Cf. T. CANNON, *Reducing People's Vulnerability to Natural Hazards. Communities and Resilience*, cit., 9.

Act on Occupational Health and Safety. In other words, these features allow people to tackle and react to potential and actual risks because they are prepared and trained properly.