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Surfing across industrial revolutions: A resilient sensemaking perspective on innovation

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Abstract

Employing the sensemaking perspective, this paper aims to study the relationship between social innovation and resilience. The study highlights how sensemaking of social innovation is a process that takes place within existing social and economic representations. This study has a qualitative nature and is based on multiple case studies, which is the methodology best suited to highlight the drivers of social phenomena in specific socioeconomic contexts and which characteristics they manifest. The paper contributes to the literature along three different lines. First, it describes social innovation as the resilient outcome of sensemaking or the result of a capacity for collective reorganization following environmental, political, economic, and social disruptions. Second, it provides policymakers with a model to use to establish the intensity of social pressure and the openness of baseline social representations to change. Third, it allows policymakers to jointly observe and analyze the relationship between social representation and economic representation, highlighting the central role of firms in achieving social innovation. Although this paper presents the findings of a wide theoretical analysis, the developed model needs to be empirically tested by firms and policymakers.

KEYWORDS
industrial revolutions, longitudinal comparative analysis, resilience, sensemaking, social innovation

1 | INTRODUCTION

In recent decades, unpredictable and high-impact events have become more frequent than ever, challenging policymakers and socioeconomic actors. To give an example, the COVID-19 pandemic and Ukraine war have demonstrated the complex nature of society: a rhizomatic net of interdependent relationships in which any point can be connected to any other (Eco, 1984).

However, although often labeled black swans, such catastrophic events only acted as catalysts for megatrends that were already underway: global aging and social inequality, economic growth vulnerability, digitization,

platformization of society (Calabrese et al., 2021; Van Dijck et al., 2018), climate change, and wild urbanization (Kuhn & Margellos, 2022). These megatrends are all distributed on a broader Kondratiev wave and, consequently, all have much deeper antecedents than their presumed cause.

This poses the need for institutions and policymakers to move beyond established socioeconomic models toward the implementation of new policies of social innovation.

Following Peter Drucker's (1957, 1987) approach, social innovation can be defined as a process that recognizes and values the interdependence between technological and social change: changing social practices and behaviors can be harnessed as a driver of innovation for technological

development, and conversely, successful technological innovation can drive societal change. The possibility of changing social practices makes social innovation both a driver and an outcome of technological innovation where learning plays a key role.

Precisely in the realization of these widespread changes, a focus on resilience has (re)gained centrality. However, what kind of resilience is needed to address complexity? Indeed, resilience is a multifaceted concept: it can be understood either as the ability to absorb the impact of a sudden change and adapt in response or as a process of knowledge exploration to drive a transformation in responses to the unexpected.

Survival, viability, internal and external resource recombination, bricolage, and improvisation form the center of the resilience construct: this, in socio-organizational terms, relates resilience to *sensemaking* (Weick, 1993, 1995). Sensemaking, the process through which organizations and societies give meaning to their collective experiences, was introduced by Weick in the 1970s with the aim of analyzing the role of meaning in decision-making. The emergence of the concept of sensemaking marked a profound change in both organizational and social studies: meaning drives socio-organizational action. Indeed, when dealing with a constantly evolving scenario where a whole reconfiguration of the environment is required and established schemes are no longer useful, resilience – understood as the outcome of a sensemaking process – appears to be a true enabler of social innovation, as it facilitates learning. However, although a very large body of literature exists on innovation and resilience in their social, technological, and organizational dimensions, a reading that holds them together through the interpretative lens of sensemaking still seems to be lacking. This interpretation needs more consideration in academic considerations since it may have a role in dynamically framing innovation and allowing policymakers to follow the shades of change in their socioeconomic environment. Indeed, when a new event (e.g., the rise of a new technology) or an unforeseen hazard (e.g., a pandemic) occurs, previous social, organizational, and economic preparedness (i.e., rules, mores, resource allocation approaches and so forth) may not be enough to cope, often becoming a cage for change and inhibiting a resilient response. The present work aims to fill this gap.

Accordingly, the paper is structured as follows: after a brief introduction (Section 1), the literature review (Section 2) will frame resilience as a sensemaking process (Section 2.1) and provide an overview of the interplay between social and technological innovation (Section 2.2). In particular, the learning dimension of social innovation will be highlighted (Section 2.3). Subsequently, once the case study methodology is introduced (Section 3), the

paper focuses on the case study setting (Section 4) and describes some emergent evidence from the case analysis (Section 4.5). This will be followed by discussions (Section 5) in which a model for the resilient management of social innovation will be proposed. Section 6 presents the conclusions.

2 | LITERATURE REVIEW

2.1 | Framing resilience as a sensemaking process

The etymology of *resilience* comes from the Latin *resaltare*, which means to rebound, to get moving again or to result from, and possibly from *resilire*, with the literal meaning to jump backward: resilience is used to indicate the process of adapting to emerging circumstances in the face of shocking events. The early inspiration for the term came from engineering (specifically the study of material strength), focusing on capacities of the elements in a system to bend, flex, adapt, and mold to continuous changes under stress (Bodin & Wiman, 2004; Dougherty, 2008; Gordon, 1978).

The ability of a system to withstand the stresses of environmental loading forces closely relates to the composition/combination of the system pieces, their interlinkage, and the modality through which change is transmitted along the entire system. Indeed, every system naturally contains some degree of internal adaptation to counteract other forces that would potentially drive it toward destructive brittleness (Klein et al., 2006; Taleb, 2012). This property constitutes the central premise of resilience. However, several other domains of knowledge have investigated its meaning and implications: from engineering, as previously cited, the term has also been documented in ecology, physics, psychology (to describe adaptive capacities of individuals), sociology (to describe the adaptive capacities of human communities and broader societies), and organizational studies (Adger 2000; Brown & Kulig, 1996; Hamel & Valikangas, 2003; Holling, 1973; Sonn & Fisher, 1998; Walker & Salt, 2012; Weick, 1995; Weick & Sutcliffe, 2015; Werner & Smith 1982;). However, the prevailing focus is survival, maintaining viable strategies to accommodate change: resilience entails the potential to exhibit resourcefulness by using available resources, bricolage, and improvisation in response to different contextual challenges (Ciasullo et al., 2022; Durodie, 2003; McManus et al., 2007; Pooley & Cohen, 2010; Weick & Sutcliffe, 2015).

In socio-organizational terms, this is consistent with sensemaking (Kilskar et al., 2020; Maitlis & Christianson, 2014; Weick, 1993, 1995). *Sensemaking* is the process by which organizations and whole societies give meaning to their collective experiences; it has been defined as

"*the ongoing retrospective development of plausible images that rationalize what people are doing*" (Weick et al., 2005, p. 409). It is, therefore, a continuous retrospective social and contextual process, elaborated from existing evidence, driven by plausibility rather than accuracy (Weick & Sutcliffe, 2015). The rise of sensemaking marks a deep change in both organizational and social studies, underlining how meaning drives the action of organizing and focusing attention on the cognitive dimension of organizations and societies (Stigliani & Ravasi, 2012; Westley & McGowan, 2017). It is a collaborative process of creating shared awareness and understanding out of different individual identities, perspectives, and interests (Huff, 1990; Stigliani & Ravasi, 2012). Sensemaking, therefore, as a process of creation, interpretation, and enactment, is influenced by multiple dimensions, for example, individual, or organizational identity, cognitive frameworks, personal or strategic goals and technology (Maitlis & Christianson, 2014; Sandberg & Tsoukas, 2015).

It is important to specify that the sensemaking process is not decontextualized but takes place within a frame (Kahneman & Tversky, 1979; Klein et al., 2006), as a social representation (Moscovici, 1981; Wassler & Talarico, 2021), and a set of shared values, ideas, metaphors, beliefs, and practices among members of social groups (Maitlis, 2005). In turn, the institutional context influences the sensemaking process and its outcomes (Sandberg & Tsoukas, 2015).

Such social representations construct an underlying interpretative assumption about the relationship among information. This has two main purposes (Moscovici, 1988):

- maintaining consistency in decision-making processes, and
- managing uncertainty resulting from a lack of precise information.

Furthermore, the same process of sensemaking may occur in economic systems (Meyer & Rowan, 1977): economic action is indeed a social action embedded in an institutional frame. Accordingly, we may refer to the existence of economic representations in dialectical relation with social representations, whose main dimensions are the organization of resources/competencies, firm organization, the financial system, and the labor market (Biggart, 1991).

Exactly because of this organizing function, however, social, and economic representations play an ambiguous role in enabling resilience: when crystallized, in fact, they undermine the existing balance between the social mechanisms of self-organization and command and control, provoking a crisis and requiring social efforts to be guided

(Crozier, 1971; Gouldner, 1954; Islam, 2023; Simone et al., 2017) while fueling the risk of social conflict. Innovation and its associated learning function are the trigger through which resilience shapes new social meanings and forms but are also the result of a sensemaking process. Thus, in what follows, this work will outline the main contours of social innovation in relation to the technological dimension.

2.2 | Social and technological innovation: A forking path

Despite its long history, social innovation only returned to the focus of socioeconomic debate during the 1950s (Drucker, 1957; EC, 2013; Godin 2012; Howaldt & Schwarz, 2010; Moulaert & MacCallum 2019; Mumford, 2002), mainly emerging as a construct to address major social challenges (Battisti, 2014; Edwards-Schachter et al., 2012; Hassan, 2013; Moulaert et al., 2013). Since its inception, the term has had a distinct transformative connotation (Moulaert et al., 2017) that has oriented policymakers toward changing the *status quo* that was keeping social, political, cultural, and economic systems stalled (Godin 2015; Stark, 1958). This became evident from the 1970s onward, when major socioeconomic issues were addressed through business networks, interest groups and public participation in the formulation of social and economic policies (Berry, F. S., & Berry, W. D. 1999; UN, 2015), creating the conditions for real sharing and better decision-making (Howlett et al., 2009).

However, despite extensive literature on the subject, it is not easy to explain what social innovation is. Often used as an *imperative of the present* (Godin, 2012; Pol & Ville, 2009), social innovation has, in most cases, avoided a comprehensive definition (Moulaert et al., 2013). This has often been justified by the idea that its origin is rooted in practice rather than in scientific research, as it involves a plethora of activities stemming from improvisation and tacit knowledge acquired through the experience of decision-makers (Bouchard, 2013; Koay and Lim, 2023; Murray et al., 2010; Schultz, 2019). Another barrier is represented by the pervading – albeit partial – marginality of social innovation in economic theories (Howaldt et al., 2015; Prahalad, 2012) and the tendency to overlap its meaning with that of technological innovation (Bulut et al., 2013; Linton, 2009).

More comprehensively, Mumford (2002) defined social innovation along a *continuum* with technological innovation. On the one hand, technological innovation is an unpredictable and nonlinear source of change, the process by which a firm develops a new product/service whose technology has been identified as a critical success factor in increasing competitiveness in the market (Ardito

et al., 2021; Garud et al., 2016; Rosenberg, 1982). On the other hand, to be realized, social innovation requires the social legitimation of what was previously excluded a priori (new needs, new behaviors, new ethics) and the development of new ideas and models of organization, institutions, norms, rules, and behaviors (Simone et al., 2017). Thus, social innovation stems from a stable model of interaction (with a previous social representation) and addresses actual social needs and requirements: this may certainly be influenced by technology (Bulut et al., 2013; Mumford, 2002).

Precisely in this direction, Phills et al. (2008, p. 36) define social innovation as "a novel solution to a social problem that is more effective, efficient, sustainable, or just than actual solutions and for which the value created accrues primarily to society as a whole rather than private individuals."

The adjective "social" also contains crucial concepts such as learning, social capital, social interaction, and social networks (Castells, 2011; Nicholls & Murdock, 2012). The debate over the connection between social and technological innovation is not irrelevant, as it confronts questions that can no longer be postponed about the nature and role of innovation per se in contemporary society (Godin, 2015; Gulbrandsen, M., & Aanstad, S. 2015). Therefore, following Keller (2006), Moore et al. (2012), Hjørland (2015), and Avelino et al. (2019), it can be argued that the process of conceptualizing social innovation is embedded in the interactions between people and groups within social systems; that is, it is the result of the constant socialization and institutionalization of meanings. According to Keller (2006) and Avelino et al. (2019), this perspective ranges from the process of creation and institutionalization of new knowledge as an objective reality to the mechanisms of creative adoption that individuals realize from the available collective stock of knowledge (theories, values, language, routines). The social construction of knowledge is, therefore, an evolving process, while the foundation of knowledge comprises sociocognitive devices crystallized in institutions, ideas, and technologies (Arthur, 2009; North, 2006). It remains to be clarified, therefore, which is the best starting point for the study of innovation: the conservative moment, prescriptive in nature (Merton, 1968; Weber, 1947); or that of adaptation and transformation, linked to the emergence of new social needs and technological transformations (Grandori, 2020). Indeed, technological innovation transforms society by balancing emerging needs, interests, and goals and by speaking an open language that stems from the continuous recombination of new knowledge, interactions between different interests and actors and concrete possibilities. Social and economic representations provide coherence to socioeconomic action and codify the technical-political knowledge useful to achieve specific goals: they constitute the cumulative and self-referential structure inherited from the past or the shared value system of any society (North, 2006). Many authors suggest an analytical approach that brings together homogeneous elements such as norms, institutions, social values, and available technology on the one hand and actors legitimized to innovate and modes of innovation on the other hand (Edwards-Schachter et al., 2012; Godin, 2012; Moulaert & Mehmood, 2020). However, social innovation can be investigated both as an outcome (Godin, 2015; Nicholls & Murdock, 2012; Schumpeter, 1934; Sharra & Nyssens, 2010) and as a process (Franz et al., 2012; Schachter et al., 2015). As an outcome, social innovation derives from relationships and initiatives undertaken by organizations and individuals, often in collaboration with state and market actors, organized in formal and informal networks, to promote greater equity and pursue real socioeconomic transformation and better living conditions for society as a whole. As a process, social innovation derives from the perception of a social void, a need unmet by the socioeconomic context, the market, or the state (Moulaert et al. 2013, 2017; Moulaert & MacCallum, 2019). Once identified, needs must be linked to new technological and/or organizational possibilities: crisis has historically been a driver of profound social and technological innovation (Arthur, 2009; Maielli et al., 2022). For instance, unions supported the process of industrialization and urbanization during the first and second industrial revolutions (Galbraith, 2017): support for these phenomena arose as a reaction to the pressure arising from new conditions of need (Defourny et al., 2009), and industrial success is strongly linked to the participation and involvement of a wide network of actors and interests (Murray et al., 2010). The vision of social innovation outlined here takes on the contours of a shared, innovative, and constructive social value (Porter & Kramer, 2006). We will follow this approach.

2.3 | Social innovation: A resilient learning-based perspective

As mentioned, social innovation is the result of a vast learning process involving a variety of stakeholders and knowledge sources (Borrás & Edler, 2020; Garud et al., 2016) linked by a network of social interactions (Lacan, 2021; Lundvall, 2010). It is precisely from these types of learning that a new form of social capital arises (Maielli et al., 2022; Reckwitz, 2002).

The learning perspective emphasizes interaction as a sensemaking practice involving perceptions, meanings, competencies, and skills (Reckwitz, 2002; Shove et al., 2012): such practices are not isolated from the purposes,

values, and characteristics of the sociocultural, economic, and institutional context in which learning takes place (Grandori, 2020; Hellström, 2004).

Moreover, learning not only encompasses the acquisition of new competencies and skills but can be defined – in a broad sense – as any process involving a permanent change in individual, organizational, or social capabilities (Illeris, 2007; La Sala, 2020).

On the other hand, social innovation also implies the institutionalization of practices that push actors to change entire systems of rules and relations or the very distribution of resources (Scott, 2008): this is not simply learning new behaviors but real cognitive processes that emphasize the creation of new meanings (Geels, 2010; Weick, 1993).

Social innovation is based on a process of sensemaking involving inputs, resources, capabilities, social actors, and contextual conditions (economic, social, cultural, and institutional).

Thus, the learning perspective implies the presence of a comprehensive theory that addresses innovation in ideas and behaviors and not only in technologies related to change (Godin, 2015). Overall, then, social innovation involves interpretation and recombination that does not stop at resources, competences, and capabilities but involves the social, economic, and institutional context up to and including language itself (Charmaz, 2014; Howaldt & Schwartz, 2010; La Sala et al., 2022a; Latour, 1987).

Accordingly, to frame the phenomenon of social innovation, we use sensemaking and take a processual approach: innovation is the result of a broad learning process, while resilience is the outcome of a sensemaking process (La Sala et al., 2022b; Maielli et al., 2022; Manca et al., 2017). Thus:

- RQ1: Which nature does the relationship between social innovation and resilience have? Is it directly or inversely proportional?
- RQ2: How may the sensemaking lens be adopted to guide policymakers toward social innovation?
- RQ3: What role do firms have in enhancing or inhibiting social innovation?

In what follows, an attempt will be made to answer these questions.

3 | METHODS

The methodology employed here is qualitative: it consists of a longitudinal comparative analysis of four cases, namely, the four industrial revolutions. Industrial revolutions are the perfect synthesis of the interdependence between social and technological variables and due to the crystallization and homogeneity of their basic princi-

ples, can be traced back to proper social representations (Moscovici, 1988). In particular, they are the first representations that can be framed on an international, globalized level. We consider the case study approach to be the most suitable since the narrative method makes it possible to better highlight why social phenomena occur in a specific socioeconomic context (Yin, 2017) and with what characteristics they manifest themselves (Stake, 2010). Furthermore, case studies are primarily aimed at understanding the dynamics within specific contexts and are particularly useful for developing new theory (Yin, 2017). According to Eisenhardt (1989), in fact, attempts to reconcile the emerging evidence from joint case studies with analysis of the literature increase the likelihood of creating a new overview, as the focus is on general constructs and not on single contexts (Gustafsson, 2017).

Additionally, in the choice between a single case study or multiple case studies, we lean toward the latter with an exploratory purpose, desiring to analyze the similarities and differences of different realities (Gustafsson, 2017). Multiple case studies can contribute to a better understanding of the relationships between a phenomenon and its context and to the identification of different patterns of interaction between them (Aaboen et al., 2012).

In addition, the case study methodology is a particularly effective research strategy for investigating a real phenomenon within its lived context, especially when the boundaries between the phenomenon itself and the environment are not yet clearly recognizable (Yin, 2017), that is, when the conditions of the (social) context are strongly connected to the phenomenon under analysis (Gustafsson, 2017).

4 | THE CASE STUDIES

For the entire complex process of transformation that led from the first to the fourth industrial revolution, management literature provides an essentially technological reading, highlighting the relevant impact on manufacturing, services, and the wider community. Technological innovations that accumulate and integrate in a context of dense interconnection can radically change socioeconomic structures (Bianchi, 2018; Floridi, 2014; Floridi & Cowls, 2022; Lacan, 2021). However, this reading deserves to be put in context with other fields: it is necessary to ask what is disruptive in such changes on a social level. That is, why do we talk about revolution? How do technological innovation and social pressures that stem from the transition from one industrial revolution to the next impact firms? In turn, what role do firms play in such transformations? It is necessary to go back to a wider perspective that frames these great transformations and the way they
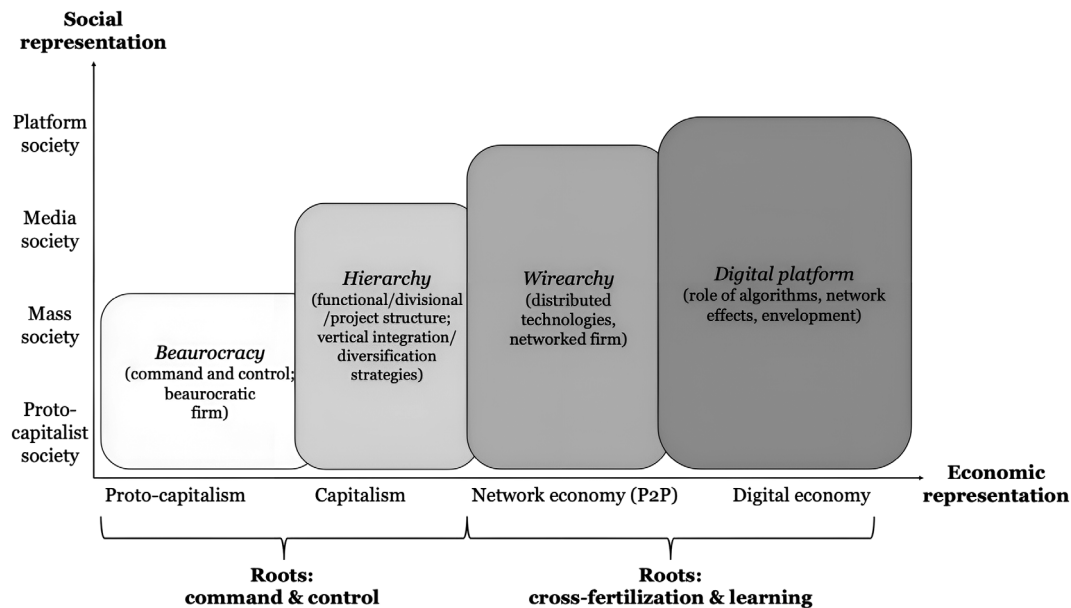
FIGURE 1 Social representation, economic representation, and firm archetypes.

affected the organization of resources and skills for the market, generating wealth (but also marginalization) in entire socioeconomic systems. In what follows, there will be an attempt to return to the origins, reconstructing the history of the industrial revolutions along two lines: social representation and economic representation (Figure 1).

4.1 | First industrial revolution (1770–1870)

4.1.1 | Social representation: Proto-capitalist society

Described by Adam Smith in "*An Inquiry into the Nature and Causes of the Wealth of Nations*" (1776), the first industrial revolution has its roots in the political revolution of 1688–1689. This political moment generated a social class that could assert itself through skills and technologies of the time and created the conditions for the scientific revolution initiated by Isaac Newton and the cultural revolution of John Locke, who extended the scientific worldview to social dynamics. The first revolution brought extraordinary transformations, with profound effects on previous social and production arrangements and the emergence of new needs and political conflicts (Düppe & Weintraub, 2019). From the labor perspective, the main innovation was specialization and the associated need for technical schools. Thus, an initial, transversal social need emerged: training. However, further social issues emerged, including demographic issues associated with standards of living (e.g., the advent of a new urbanization and of

company towns) and the growing complexity of social relations due to increased social polarization and stratification (e.g., the debate on women's emancipation and income inequalities). The proletariat and mass society were born and with them the need for justice and the protection of labor rights: workers developed a new class consciousness (Galbraith, 1987). The new working class felt the need to take part in political life to demand and defend new rights, including suffrage, the formation of political parties on a national basis, and protection for labor unions. There was great social opposition to this profound change, certainly including Luddism.

4.1.2 | Economic representation and the firm archetype: The bureaucracy and factory system

Family businesses founded and run by owner-entrepreneurs, surrounded by a small group of salaried employees, had an extremely simple organization: the entrepreneur was the center of both strategic and operational decisions but could avail himself of specialized administrative personnel. In the early stages of the industrial revolution, financial markets played a marginal role: self-financing was sufficient to sustain business development, given the relative technological simplicity needed for production. The complete centralization of production also allowed entrepreneurs to control workers more efficiently (often affecting their motivation - Atshan et al., 2022) both by reducing the appropriation of raw materials and by controlling the quality of production (Bianchi, 2018).

4.2 | Second industrial revolution (1870–1970)

4.2.1 | Social representation: Mass society

The second industrial revolution began with the consolidation of a public demand for infrastructure and the emergence of a private demand for homogeneous goods at low prices (linked to the income crisis inherited from the first revolution). These changes would be realized within large-scale plants centered on the division of labor to increase economies of scale. Similar to the previous revolution, the second industrial revolution was characterized by the convergence of different technologies that enabled the organization of large-scale industrial production (Düppe & Weintraub, 2019). The main sectors involved were chemicals, electricity, oil, steel, and cars. Drawing on the studies of Babbage and Ure, a technical literature developed that pushed to standardize production activities, maximizing their outcomes. These efforts, systematized by Frederick Taylor (1911), gave rise to the Scientific Organization of Labor. The social impacts of this innovation were soon evident: there was a further division between the large working masses and the concentration of decision-making in the hands of top management, which also implied a clear divergence in knowledge, competencies, and capabilities (Nuvolari, 2019).

On a social level, the second industrial revolution was a positive moment for civil rights since it was characterized by a decisive reduction in inequality and in the gap between social classes as incomes rose. However, these social changes were neither linear nor predictable: state intervention (the welfare state) played a large role, which, since the end of the 19th century, manifested in redistributive actions and attention to social care (e.g., pensions, and accident and health insurance); on the other hand, there was a long phase of pressure and conflict to demand greater forms of protection (e.g., a minimum wage) and union associationism. Eventually, by the mid-1970s, the world was rigidly divided into two noncommunicating blocs, the capitalist and the communist, in which Fordism seemed to be the only possible organization of production and managerial capitalism almost existed as a social archetype (Bianchi, 2018).

4.2.2 | Economic representation and the firm archetype: Hierarchy and Fordism, vertical integration, and diversification

Between the first and second industrial revolution, the Fordist model became widespread. Fordism was characterized by standardized mass production (production level),

vertical integration (strategic level), the assembly line, and one best way (organizational level). Complete vertical integration implies a significant factory size but also significant economies of scale. There are many reasons to adopt this approach: direct control of the supply chain, reduced supply times, and lower costs than buying from external companies (the buy solution) (Nuvolari, 2019). There is no gap between the Taylorist model and the Fordist conception of production: Fordism turned labor into an objective and abstract function, lacking the human dimension (Düppe & Weintraub, 2019). After the Second World War, thanks to the opening of international markets, the greater availability of capital and the separation between ownership and management, the first diversified corporations began to emerge. Capital was concentrated in large anonymous holding companies or aggregated entities expressing the interest of shareholders and carrying collective responsibilities that were no longer easily identifiable. Managerial capitalism was born (Chandler, 1962).

4.3 | Third industrial revolution (1973–2011)

4.3.1 | Social representation: Media society

Up to the 1970s, Western growth had been based on stable costs for labor and commodities, the absence of inflation, and a fixed exchange rate regime. The nonconvertibility of the dollar (1971) and the first oil crisis (1973) triggered inflationary processes that could not be contained except through a compression of wages: this unleashed new worker tensions. On the economic level, the automation of production lines became the response to contain both labor costs and union conflicts. In the 1980s, with the emergence of new information technologies (ICT), the third industrial revolution began, with very profound effects on the organization and quality of work in several production processes (Bianchi, 2018). A phase of tertiarization began, both in terms of employment and contribution to GDP, which led to defensive attitudes among older industrializing countries. The information society incorporated a new uncertainty that the slow disintegration of the USSR amplified. To face this uncertainty, an alternative and more collaborative model of industrial organization was generated from the logic of the network (Beck, 2016; Benkler, 2006; Castells, 2011). The fall of the Berlin Wall led to a further opening of international markets, which was accompanied by a reduced role for the state in the economy and a gradual shift away from manufacturing. This was the birth of a new finance model decoupled from the real economy and the emergence of the liquid society, in which group belonging is not based on ideology or

values but essentially constructed through consumption behaviors (Baumann, 2013). Sustainable development and the green economy were affirmed as models of sustainable economic development that integrate public policies attentive to climate change and the enhancement of responsible managerial practices and consumption behaviors (e.g., UN 1987 meeting).

4.3.2 | Economic representation and the firm archetype: The network economy (P2P) and wirearchy

With the rise of information technology, the organization of production changed radically. Firms gradually abandoned hierarchy in favor of networks. Restructuring has led to a new model of organizing that consists of a peer network that uses distributed technologies (i.e., the internet). Peer-to-peer (P2P) production, coined by Yochai Benkler (2006), describes a new economic model in which the creative energy of people is coordinated and channeled into large projects without the help of hierarchy, thanks to technology. The network constitutes an effective organizational mode to tackle problems of knowledge exploration, exploitation, and integration, posing itself as a truly competitive alternative to bureaucratic hierarchical organization and capitalist logic (Simone et al., 2017). It has led to a new firm archetype, that is, *wirearchy*, whose main examples are Linux and Wikipedia.

4.4 | Fourth industrial revolution (2011–today)

4.4.1 | Social representation: Digital society

Industry 4.0 is defined as a paradigm characterized by strong product customization and self-organizing ecosystems designed to ensure a close link between the real world (workers, machines, raw materials) and the virtual world (Agostini & Filippini, 2019; Floridi & Cowls, 2022). The main novelty lies in cyber-physical systems that enable the connection of objects and people through planetary information, relational networks and key innovative technologies (IoT, big data, artificial intelligence, cloud computing, and platforms). Interactivity, decision-making capabilities, and independent learning enable sudden adaptations to environmental changes, implying the need for a new shared language to connect humankind and the machines. This new paradigm is well beyond information technology; Industry 4.0 calls for a different ontology and a new epistemology (Floridi & Cowls, 2022). Interconnection and the related exponential production of

data are reaching cultures far apart in terms of history and tradition. Predicting the impact of this upheaval on both social and economic levels is challenging: what are the responsibilities for sustainability, poverty alleviation, and civil rights (see Agenda 2030)? How can millions of workers whose jobs were vaporized by technology be newly trained for reassignment? How can one deal with posttruth and disintermediation? This social innovation is still far from complete.

4.4.2 | Economic representation and the firm archetype: The digital economy/platform

The fourth industrial revolution is unequivocally a digital revolution. For the first time, the economic and social dimensions communicate through a common language, the algorithm, and follow the same organizational model, the digital platform (Barile et al., 2022; Eisenmann et al., 2011). A digital platform is a set of products, services and technologies developed by one or more firms that form a technological base from which other firms can develop new services, products, and complementary technologies, generating network effects (Gawer & Cusumano, 2013; Tsujimoto et al., 2018). Thus, the value of the platform is positively linked to the number of users who adhere to it: an increase in user number generates direct and indirect network effects that lead to an increase in the volume of content. At the strategic level, this translates into a process of envelopment: the platform diversifies its business by combining its basic functionalities with the functionalities required by the target market, thus creating a new platform (Eisenman et al., 2011). Once again, this is made possible by the technological hybridization achieved through algorithms: the platform acts as a hologram (Barile et al., 2022). This is a dramatic crossroads. Industry 4.0 disrupts consolidated models (mental, managerial, organizational, and social) and calls for a new sense that enables old and new actors to be reconfigured.

4.5 | Some evidence from case analysis

Following Mumford (2002), social innovation lies along a *continuum* with technological innovation. Technology is an unpredictable and nonlinear source of change, but to be realized, it requires social legitimacy (new behaviors, new ethics) and the development of new ideas and models of organization, including new institutions, behaviors, norms, and rules (Barile et al., 2019).

The call for new social innovation starts from a perceived shift in the social fabric that frames change as either a threat or an opportunity. This has a potential impact

in two directions: it generates dissonance with collective norms and practices while it also turns into social pressure for change. For example, fears about the future of work or a loss of income due to the rise of artificial intelligence are one way of encoding and transmitting meaning. The different frames for social meaning assume a central role as society produces new meanings that need contextualization in an extant social representation. For example, during the first industrial revolution, Luddism became a social response to unemployment. Of course, this is only one of many possible examples: tax systems, social welfare networks, minimum wage, and the restructuring of financial systems are all social innovations.

Thus, social innovation is a process through which institutions transform and integrate previous social representations. However, institutions themselves shape the behavior of organizations and firms in the economic system, the policies they pursue and the socioeconomic outcomes of their activities. As mentioned, technologies related to production, distribution and consumption patterns play a key role. From time to time, each society defines precise social (e.g., values, behaviors) and economic (e.g., strategic approaches, organizational structures) representations to frame and manage change stemming from technological innovation or social pressures. The emerging *equilibrium*, however, is not linear but depends on learning capacity and responsiveness to change (Barile et al., 2019; Bromley & Powell, 2012; Crozier, 1971; Dick, 2015; Gouldner, 1954). This sensitive issue of social resilience requires the design of new institutional connections. There is nothing automatic about change in response to changing parameters (Galego et al., 2022; North, 2006); instead, it is a crucial sensemaking activity that allows us to unlock the hidden potential of innovation and build new coherent social and economic representations to cope with conditions of increasing environmental complexity (Katz & Kahn, 1966). Survival, bricolage, and improvisation are all levers whose direct interaction enables the avoidance of bottlenecks and social lock-in (Barile et al., 2019; Weick, 1993).

5 | DISCUSSION, IMPLICATIONS, AND A MODEL PROPOSAL

Since the first industrial revolution, human influence on the environment has rapidly grown, generating profound and often unexpected changes in the socioeconomic fabric. In these terms, resilience is an intentional act that is planned and institutionalized, resulting from a collective reorganization following environmental, political, economic, and social disruptions. However, this social outcome is not without uncertainties: the supply of knowledge and social capital is subjected to severe stress when unforeseen social or technological pressures are exerted on institutions. This is particularly evident in the institutional tension between change and stability: the structural configuration of institutions shapes the behavior of all social groups and cannot be understood without considering the interests involved.

As observed in the joint analysis of the four industrial revolutions, when faced with profound and rapid changes, societies and firms build their response along two dialectically intertwined lines:

- genotypic memory, that is, the social and economic representation already available. This reduces uncertainty and activates a system of constraints that normalizes change.
- learning from the socioeconomic context, allowing previous representations to be enriched and changed.

This process has neither a predictable outcome nor a single direction. It depends, in fact, on the intensity of social pressure following the change.

To discuss this point further, it may be appropriate to focus on the fourth industrial revolution.

Indeed, Industry 4.0 is not an exception to previous industrial revolutions but is expected to bring broader benefits and challenges due to the high level of technological convergence: given the exponential acceleration of technology, state policy and regulations may not be able to address unexpected outcomes, especially if policymakers remain reactive rather than generating policies inclusive of economic and social dimensions. To address challenges such as cybersecurity and job losses due to AI, market-oriented technological solutions alone will not be sufficient (Lim et al., 2022, Lim & Mandrinos, 2023). At the same time, however, by affecting productivity and the organization of resources, technological innovation may be a trigger for social innovation, improving welfare and responding to emerging social needs. Indeed, firms hybridize technologies with others to create new business and consumption models; they develop new strategies, influence value creation processes, and access new markets, profoundly changing the very nature of competition. In what follows, a sensemaking-oriented resilience model is proposed that can guide policymakers in managing the balance between innovation and the institutionalization of change (Figure 2).

Looking at Figure 2, we can see two reaction mechanisms, not alternative to each other, both oriented toward sensemaking and both linked to a different learning process (Argyris & Schon, 1978). The first cycle is oriented toward first-order resilience and characterized by single-loop learning mechanisms, while the second cycle is oriented toward second-order resilience and characterized
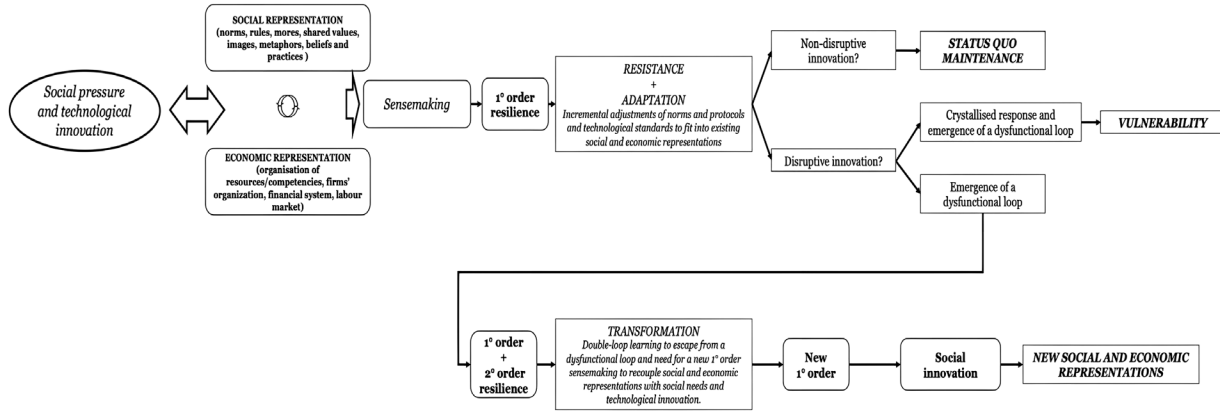
FIGURE 2 A model proposal.

by a double-loop learning mechanism. In the first case, we observe a standardized pattern of reaction, whose responses may result in resistance or adaptation: the emphasis is on codified protocols and norms on both social and economic sides. Although this response is necessary to give social systems time to design an effective institutional response, if crystallized, it can lead to a reduction in flexibility and elasticity that pushes toward self-isolation, drastically reducing learning abilities and creativity. Moreover, the capacity to generate and promote technological innovation decreases. Such a response is adequate if the innovation is not disruptive. On the other hand, in the case of a disruptive innovation, adaptation does not produce new knowledge but initiates a dysfunctional circular loop in the social response. Circular loops are invisible (or sometimes tolerated) because of high barriers to perception: the tendency to project rational explanations onto unusual phenomena just because they occur in familiar situations makes it difficult to identify and attribute responsibility for them. This is hazardous because these loops synthesize social complexity into simplified narratives, resulting in the inability to detect new problems and in increased rigidity. In the long run, this may result in the inability of social systems to learn and adapt, generating vulnerability. In this case, a double loop should be activated. Furthermore, economic representations play an equally important role: firm structures, organizations of resources and competencies, the financial system, the labor market, and the way they interact with social pressures and technology innovations are not irrelevant either. In fact, the way the balance between social and economic representations is achieved greatly influences the possibility of achieving social innovation (Khor & Tan, 2022). Figure 3 synthesizes this relationship well.

The southwestern area describes an alignment of social and economic representations toward resistance. This is a situation to pay attention to: should resistance occur, in fact, it would be impossible to detect dysfunctional loops
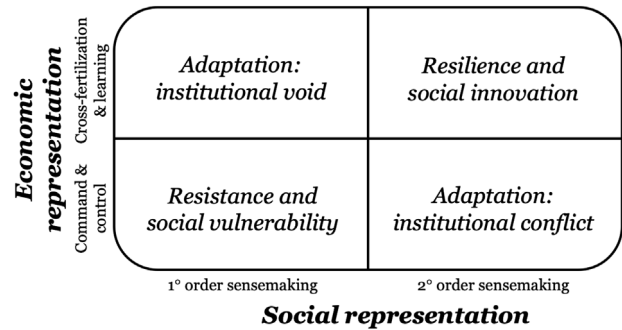

FIGURE 3 Balancing social representation and economic representation.

since social pressure toward change and thus also technological innovation are framed as a threat to the existing social and economic order. Both firms and institutions resist change.

The northeastern area describes a strong alignment between social and economic representations toward resilience and social innovation. Social innovation is generated as policymakers reinforce, through integrated decision-making processes, the positive effect generated by firms' initiatives and their learning mindset. The readiness to change and the orientation to innovate are rewarded with incentives, tax reductions, legitimization, and social recognition.

The southeastern area frames a situation of adaptation and results in an institutional conflict. In this case, policymakers play a balancing role aimed at reducing the resistance of the economic system to change. This resistance is addressed and regulated via the normative system. However, these efforts are not always able to reconfigure the economic representation but merely exploit its elasticity: the way firms compete, organize resources, and use the workforce ultimately does not fit with social pressures and the social response.

Last, the northwestern area frames a situation of adaptation and results in an institutional vacuum. This is a case of balancing in the opposite direction, where resistance to change is part of the baseline social representation. Social pressures are not detected and, indeed, are ignored because they are excluded from policymakers' political vision. This can result in a distortion in the competitive dynamic, as policymakers focus on maintaining the status quo, while firms deal with wider social issues (e.g., legitimacy, rights, welfare, sustainability). This translates into higher costs, resulting in a loss of competitiveness.

With this map, it is clear how the foundations of social and economic representations are dialectically crafted. By creating new scenarios and new ways of living, a new social representation may rise. However, this path is not fixed: the new representation to emerge from this process will need institutionalization. Thus, first-order sensemaking and its ordering function return to center stage. Vulnerability lies precisely in the total lack of recoupling different frames of understanding into a new coherent social representation. A social system stuck in first-order sensemaking would leave power in the hands of those who govern the technical process. However, as Heidegger argues in *Being and Time*, technology does not have the role of providing meaning; its task is to function in a constant search for efficiency. Consider, for example, the datafication that characterizes the fourth industrial revolution and the issues of data ownership: the way in which this is resolved significantly alters the balance of power within social systems. It is not plausible to stop the diffusion of innovation, be it social or technological, but reflecting on this balance and highlighting its nature is an issue that can no longer be postponed.

6 | CONCLUSION

Developed with Cartesian thought, the concept of growth as synonymous with progress is still widespread in Western thought. This view is based on the myth of mankind emerging victorious over nature thanks to the ability to organize into communities (social innovation) and the development of new artifacts (technological innovation).

However, this dialectical process needs to be better clarified. Whether faced with a potential change in the social context (a Kondratiev cycle) or with unforeseeable events (a technological leap), a lack of readiness to embrace and learn the new social innovation may imply that change is framed as a threat, preventing the recognition of any vulnerability inherent to the baseline social representation (the resistive dimension of resilience).

While this may prove effective in a closed system, it is not a viable choice for the governance of complex dynamic systems. In this case, it will be necessary to integrate resistance with the adaptive and transformative dimensions of resilience, which will increase creativity and the capacity to learn.

This was the aim of this comparative study: showing how even macroscopic phenomena, such as industrial revolutions, have followed a dialectical path made of the collapse of one sense of social meaning and the rise of a new sense to replace it. From one revolution to another, social innovation would have been impossible without questioning established patterns of previous social representations. Hence, sensemaking plays a fundamental role in the production and diffusion of resilience and social innovation. However, it is neither an emergent nor a linear process.

In *Time of the Church and Time of the Merchant*, Jacques Le Goff argued that the time of the Church and the time of the merchant are different and not coincidental. Similarly, the times of technology, economy and society are different and, by intersecting with each other, may lead to applications that generate new needs, pressures, and issues. It is necessary to have the collective capacity to grasp these intersections: policymakers will have to engage disruptive innovations with coherent policies capable of initiating socially sustainable development that involves the entire institutional level. Indeed, the learning capacity of a society is based not only on creativity but also on the ability to institutionalize change into new norms, behaviors, and values. Fundamentally, social innovation, viewed from a learning perspective, is the result of a dual process of sensemaking that passes from the construction to the institutionalization of a new meaning, or from a disruptive (often technological) dimension to a constructive social one: these two dimensions are connected but not necessarily convergent. As mentioned, one objection to the three previous industrial revolutions refers to the inability of their policies to frame the issues that plagued those societies. This study confirms that digital society and the platform model will become one such innovation if their social and economic as well as technological effects are recognized. In this process, the role of firms will be central. Indeed, firms, embedded in a specific socioeconomic context, are themselves social structures, and every activity in their value chain has a definite impact on social well-being. The inability to generate innovation and to be competitive is an institutional failure before being a market failure.

AUTHOR CONTRIBUTIONS
Maria Vincenza Ciasullo: Conceptualization; Data curation; Supervision; Writing - review & editing. Mario Calabrese: Conceptualization; Data curation; Writing - review & editing; Supervision. Antonio La Sala: Conceptualization; Writing - original draft; Methodology; Writing - review & editing; Data curation.

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