5. Moving towards innovation through withdrawal: the neglect of destruction

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Although various theories, models and narratives compete with each other to establish the right way to think about and manage innovation, theorists’ views have nevertheless converged in relation to some aspects of innovation and how to define it. While classical studies explore the Schumpeterian notion of creative destruction and contemporary papers inquire into technology transition, social innovation or responsive innovation, they all share the idea that innovation is the introduction of something new, the addition of something. As a consequence, scholars have studied novelty and the introduction of innovation, its adoption and dissemination or resistance to novelty, but never the destruction or withdrawal of something. This chapter documents how innovation came to be defined as the addition of something, while theorists of innovation see destruction either as a threat or a negative consequence. The dominant viewpoint is that destruction and withdrawal are nothing but a consequential process of no importance. Hence, they are not associated with innovation; they are left out. Even though some major innovation scholars, such as Schumpeter or Callon, mention the necessary destructive or detachment process as being constitutive of the innovation process, they do not investigate it. We therefore know very little about this side of innovation. This chapter offers a critique of current representations of innovation. It examines innovation through destruction or withdrawal and proposes an alternative or complementary approach with possible political, social and managerial consequences.

In the first section of this chapter we examine thinking on innovation, covering both classical and contemporary authors. We then document a case study, related to no-till agricultural practices, and identify other examples of everyday life, which we use to propose an alternative way to think about innovation. In the last section we discuss a number of factors (disciplinary bias, cultural values and ideology) that explain the neglect of destruction or withdrawal in innovation discourse and theory.
5.1 CLASSICAL AND CONTEMPORARY THINKING ON INNOVATION: THE ‘INTRODUCTION-OF-SOMETHING-NEW’ BIAS

As regards innovation, Joseph Schumpeter appears to be a seminal figure. He is seen as the ‘father’ of studies on innovation (Freeman, 2003), introducing these to economic theory. He pointed to technological innovation as a source of economic change (Schumpeter, 1942 [1962]) and as a generator of business cycles (Schumpeter, 1939). According to him, innovation consists of the introduction of a new good or service (including ones that have been modified), or a new method of production. Alternatively, it is associated with the opening of new markets, access to a new source of raw material supplies, energy or goods, or the implementation of a new form of organization. He also uses the distinction between invention (the act of intellectual creativity) and innovation (the economic decision to adopt and apply an invention) (Schumpeter, 1939). He defines technological innovation as a new combination of means of production (a change in production factors) to produce goods (Schumpeter, 1939, p.87). The economist W. Rupert Maclaurin (1950) expanded on Schumpeter’s ideas, analysing technological innovation as a process and proposing a theory of technological innovation, later called the ‘linear model of innovation’ (Godin, 2008). In both cases, the core characteristic of innovation is the introduction of something new.

However, in his short essay entitled *Capitalism, Socialism and Democracy* (1942), Schumpeter also stresses that technological innovation is a *creative destruction*. Here, he argues that innovation is not only the introduction of something new but also the elimination of previous products and their substitution by new ones. It can involve modifying previous processes, destroying existing industrial structures and practices, reducing their long-run scope and weakening their established positions. Thus, Schumpeter introduces the idea of a two-sided phenomenon: the introduction of something new and the simultaneous destruction of something previously prevalent. Following the publication of this essay, Schumpeter’s metaphor was frequently cited but not really taken up as a theme.

5.1.1 Leaving Out Destruction: Schumpeter’s Legacy

Since the first half of the twentieth century, scholars have tended to define innovation in order to create indicators and set up comparisons. The drafting of the *Oslo Manual* (OECD, 2005) is based on Schumpeter’s ideas. The document specifies what innovation means and proposes the following definition:
An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. (OECD, 2005, p. 54)

In a previous version of the Manual, innovation was only considered as technological innovation (creation or improvement of products or processes). This third version extends the definition to marketing and organization, again reflecting Schumpeter (Bontems, 2014). However, the definition presents innovation as something new and does not focus on its destructive side. Even when the Manual specifies the key characteristics of innovation, only the creative side appears (the outcome of the innovation, the appropriable spillovers, for example, patents, the new knowledge involved or a new combination of existing knowledge, the provision of a competitive advantage and so on), even though some challenging aspects are identified (for example, uncertainty and necessary investments).

The Manual implicitly promotes an optimistic conception of innovation. In the same way, the dominant paradigm in the literature on innovation refers to innovation as the economically and socially successful introduction of something new and its dissemination, which leads to the cumulative history of technological progress. As this definition places commercial and social success on an equal footing, it fits in with the dominant ideology of innovation, supported by scientific research and technological development without any indication of the conditions of application or questions about relevance or limits. Even though some scholars, including historians of technology (for example, Basalla, 1990) and sociologists, challenge this notion of innovation and technological progress, the dark side is not included as a constitutive component of the innovation process.

Among scholars there are debates regarding what might be the relevant model for analysing and managing innovation. In the linear and hierarchical model of innovation, it is seen as an outcome of science and applied science. It involves researchers discovering new phenomena and producing new knowledge, which is then embodied in products by skilled engineers and exploited by opportunistic entrepreneurs (Forest, 2014). However, statistical and case studies have led theorists to identify a number of discrepancies with this linear model. Authors such as Kline and Rosenberg (1986), summing up the ideas of the previous two decades, create a more complex and emblematic model of the innovation process, linking several activities through different loops (the ‘chain-linked model’). In this model, innovation is not dealt with as the product of science and research and development (R&D) activities. Moreover, this is confirmed by surveys on innovation in companies developing new products without performing in-house R&D (CIS, 2012). But finally, no matter whether innovation is
seen as mainly technical or socio-economic too, as a linear or a non-linear process, most discourse presents innovation as the introduction of something new.

Novelty seems to be the key characteristic of innovation. The challenge is to be the first to introduce a new idea, or the first to commercialize a new product or apply a new way of working as reflected in models and theories of economics and management (Schmookler, 1966; Mansfield, 1971; Freeman, 1974). With models based on competition, such as the ‘winner-takes-all’ model, the challenge is to be the first with the novelty (Frank and Cook, 1995). Similarly, in most recent innovation policies, such as the Lisbon Agenda, innovation is seen as an effect of knowledge production and dissemination, as well as of technology transfer, even though some changes in terms of governance and innovation regimes are admitted (Joly et al., 2010) together with a shift towards a distributed process (open innovation, open source). New technological perspectives are sustained on the expectation that they may have benefits to offer; even if the novelty is no better than the existing solution, its development may lead to a better solution in the future. Innovation depends on the capacity to improve the novelty. With the new regime of collective experimentation, the core process is participative but it also refers to the introduction of something new, supported by the creative engagement of a variety of social groups, such as patient associations (Rabeharisoa and Callon, 2004), or by ascending innovation dynamics (Wiskerke and van der Ploeg, 2004). These regimes reflect the idea that society has become a laboratory for innovation (Krohn and Weyer, 1994) but, once again, the aim is still to develop new products and processes.

5.1.2 Responsible Innovation, Transition and Obsolescence: Destruction Makes a Limited Comeback

Several bodies of literature are more sensitive to the negative and largely unexplored aspects of innovation. For instance, regarding the ‘responsible innovation’ debate (Stilgoe et al., 2013), which takes into account the potentially negative impacts of such innovation, the authors consider the difficulties of governing technologies in order to avoid irreversible technological trajectories. Their discussion focuses on how to avoid the negative consequences of innovation by guiding technology development in an acceptable direction. However, their reference to ‘responsible research and innovation’ is still tied to the introduction of new products and processes. Destruction has also been highlighted in entrepreneurship studies and organization studies, for example, regarding societal entrepreneurship (Berglund and Johansson, 2012).
The literature on technological transition (Geels, 2002) questions how a number of major long-term technological changes could come about in the way society functions. This literature is, moreover, much more sensitive to regulation, infrastructure, user practices, meaning or culture than it is to technology. It refers to multi-level perspectives where a process of variation, selection and retention is combined with a process of unfolding and reconfiguration. These aspects provide an opportunity for more in-depth research into the notions of redefinition, reduction, withdrawal and destruction as components of the overall dynamics of innovation. They offer a conceptual framework for focusing on sociotechnical configurations involving substitution as well as changes in other elements (Rip and Kemp, 1998). In the actor-network theory (Callon, 1986; Latour, 1987; Law and Callon, 1992), sociotechnical change is described as a process where assemblies of associations are shifted and changes operated on different elements.

With the ‘technological regimes’ concept, Nelson and Winter (1982) put forward the theory that coordination between actors is the outcome of organizational and cognitive routines. Technological regimes create stability because they guide innovative activity towards incremental improvements along trajectories, generating niche innovation, technological add-ons and hybridization. According to Rip and Kemp (1998), routines are also embedded in the knowledge base, engineering practices, corporate governance structures, manufacturing processes and the material context of society. Thus, sociotechnical regimes generate incremental innovation, which means improvement (not destruction) of products, processes and organizations, while radical innovations emerge in niches where novelties are protected from market selection (Schot, 1998). These niches are crucial for opening up the possibility for change and creating tensions inside the regime (Freeman and Perez, 1988), leading to uncertainty and a weakening of the old regime (‘technological obsolescence’ is a form of ‘creative destruction’). In this respect, destruction can be seen as a component of innovation dynamics. Some authors highlight competence-destroying activities, which make existing knowledge bases or business models vulnerable to attack and render them obsolete. However, Bergek et al. (2013) argue that this overestimates the ability of new entrants to destroy established industries. Creative accumulation is still a relevant notion for explaining innovation.

There is also a body of literature that looks at withdrawal as a way of improving strategic flexibility (growing through withdrawal) (Pauwels and MatthysSENS, 2004). For example, ‘export market withdrawal’ can be seen as a firm’s deliberate action to reduce its engagement in an export market. Such withdrawal is not simply a question of changing tactics, it is an
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instrument for performance optimization within a permanently changing context that results from international experience. It is a proactive option in the case of a structural exogenous misfit between the strategy and the changing environment.

This literature demonstrates a clear ‘introduction-of-something-new’ bias. Even though Schumpeter introduces the notion of creative destruction, theorists have neglected the idea that innovation can involve destroying or withdrawing something, as if such actions were only the secondary consequences or collateral effects of innovation rather than constitutive processes shaping innovation dynamics and performance. Research on innovation tends to qualify innovation processes in order to propose generic models to account for the way inventions are introduced and embedded in society. The diffusionist model, for instance, is based on the dissemination of novelties in a population of adopters (Rogers, 1962). There are very few authors who look at destruction as a component, a process or even as a strategy for innovation. Scholars have also skipped over the rationale of actors who positively contribute to destruction or withdrawal. Instead, they have promoted innovation strategies, policies and culture because this leads to the introduction of something new and better, not because the best thing to do is to eliminate something. Even alternative studies have not really changed the dominant theoretical framework. Destruction and withdrawal are still left out.

5.2 INNOVATION THROUGH WITHDRAWAL

The translation model (Callon, 1986) offers an alternative approach. It suggests that innovations are rearrangements of a variety of entities (actors, objects, institutions, norms, meanings), which mutually redefine themselves and their relations. It invites us to follow the transformations of the sociotechnical network corresponding to an innovation, its extension and consolidation. It states that the introduction of a novelty often leads to the exclusion of pre-existing entities, which are made to disappear or undergo reclassification. Innovation can thus be excluding in nature, involving dissidence, controversy and treason (Galis and Lee, 2014) as a new sociotechnical network is shaped. This applies, for example, to public phone boxes, which have gradually disappeared with the popularization of mobile phones, or to film photography, which has been ousted by digital photography and is now the preserve of experts alone. The withdrawal of a previous artefact or the destruction of existing abilities is thought of as a consequence, and not the source or the starting point, of the introduction of a novelty. This is considered as a commonplace phenomenon.
However, today there is also a move towards innovations where withdrawal, or at least reduction, tends to be the very purpose of the innovation process. Let us take a few examples. In the food industry, packaging and labelling of goods abound to attract consumers’ attention to the fact that the products do not contain additives, artificial colouring, preservatives, genetically modified organisms (GMOs) and so on. In the cosmetics sector, recurrent references to products without parabens follow the same logic. In these innovations, the change applied to products is organized specifically around withdrawal, or in some cases non-addition (food without added sugar, for example). In the food distribution sector, short circuits, free of middlemen, are growing. In the world of offices and administration, a paperless organization has been advocated for the last 40 years while the humanities universe has been promoting a culture that is no longer book-bound (Vinck and Clivaz, 2014). Regarding innovation inside firms, Kimberly (1981) introduces the notion of exnovation as the dead option or removal of something (a product, a practice) from an organization. The aim is to destroy something that is no longer sustainable. Paech (2012) argues that this is something that occurs at the end of a life cycle when purging existing practices allows for fresh solutions to be adopted.

Withdrawal is the purpose of differentiated innovations; it has a structuring effect in the definition of the properties of such innovations, and it is the designers’ and consumers’ reason for acting. The current situation has thus moved away from the paradigmatic idea of innovation focused on the aggregation of something new. In the case of innovations based on withdrawal (Goulet and Vinck, 2012), the challenge is explicitly to discard certain entities. Actors sustaining the withdrawal of something expect attachments to an old product or process to be weakened. This may involve the redefinition of the qualities associated with the product or process. Withdrawal is the core process of a series of transformations that merit further study. It involves the structuring of competition between desirable and undesirable entities, some of these being erected as ‘passage points to be avoided’ (PPA) (Goulet and Vinck, 2012, p.132), in opposition to the ‘obligatory passage point’ identified by Michel Callon (1986).

In what follows, we document examples and case studies based on which we propose an alternative way of thinking about innovation. We discuss the properties of these innovations in terms of withdrawal, the forms they take, and the logic and values driving those who advocate them. To a certain extent, these innovations based on ‘less’ or ‘no’ can be compared to the expansion of certain innovations advocating simplicity and frugality. However, we believe that the central role of withdrawal stems from a different dynamic. This dynamic does not in fact involve developing new artefacts that are simple to make and use and easily accessible to all, but
designing devices and modes of action where the main characteristic is the removal of something that already exists or is generally used. We therefore propose to think about innovation in a way other than the introduction of something new.

### 5.2.1 The Drivers of Actors Advocating Withdrawal

When we look at the drivers of actors advocating withdrawal in the innovation process, we see that criticism and the desire for emancipation in respect of the entities to be removed are essential. The criticism concerns technologies or artefacts in terms of the risks they entail for humankind or nature, or the problems and limitations they cause. One illustration of this is the desire to remove or reduce the use of pesticides in agriculture, accused of polluting the environment and harming human health. The same is true with ploughing in agriculture, said to cause soil erosion, or with vaccines and medications, which have been accused of causing more harm than good, or with vehicles and the idea of banning them from cities because they generate noise and pollution, or with plastic bags in supermarkets, considered environmentally unfriendly, or with paper in publication, which limits access to cultural heritage. All of these cases call into question the use of certain technologies, which, based on user experience, do more harm than good.

One of the drivers is the development of a critique aimed at undermining a number of entities, practices or actors. The construction of critical argumentation lays the foundations for acting against an entity and in favour of emancipation from it. This work consists in questioning the presence of the entity in the pre-existing sociotechnical configuration. It involves demonstrating that a number of problems are associated with the entity’s existence and that its withdrawal or attrition would solve these. Such is the case, for example, when experts emphasize the negative impact of too much salt or sugar on health (linking it to obesity, cardiovascular disease and so on) or the disastrous influence of some industries or technologies on the climate. The fields of health and the environment thus generate much pressure for withdrawal, leading to controversies that science and technology studies have widely described. With each case treated, problematization (Callon, 1986) works through the identification and formulation of a risk, to which people or the natural environment may be exposed with the solution being to protect both through withdrawal. The pharmaceutical industry is probably one of the sectors most affected by such pressures as attempts are made to reduce drug prescriptions or initiate the market withdrawal of drugs with suspected adverse effects. The anti-vaccine movements (Pinto et al., 2013) bring together citizens
who refuse mandatory vaccination arguing that the risks outweigh the expected benefits. The chemical industry is another highly criticized sector with regard to its impacts on human health and ecosystems; it is faced with the recurring efforts of citizens or regulatory authorities who strive to withdraw allegedly dangerous substances from the market. In the case of the ban on DDT, Maguire and Hardy (2009) showed that the problematization activity performed by militant environmentalists resulted in the delegitimization of the substance. The militants attacked the very three pillars on which its use had been founded: cognitive (production and dissemination of knowledge demonstrating its harmfulness); normative (delegitimization of its use based on moral and symbolic grounds); and legislative (involvement of decision-makers to bring in laws banning the product).

In the area of farming practices, we studied the case of no-till farming (Goulet and Vinck, 2012), which involves the elimination of ploughing or tillage. Following actors who promoted and developed these practices in France during the 2000s (agronomists, farmers, agricultural inputs industry), we showed that the advocates of no-till agriculture problematized the practice of ploughing for farmers and other agricultural stakeholders by creating causal chains that placed the plough at the root of different types of risk. They first demonstrated the economic danger of such cultivation techniques by showing farmers that tillage is an expensive operation in terms of equipment and fuel, and that its elimination leads to substantial savings. They then focused on the environmental risk, underlining that tillage causes soil erosion and hence damages this essential natural resource. Lastly, they turned their attention to the symbolic danger, making ploughing the symbol of traditionalist and outdated techniques. To back up this argument, they drew examples from the international scene, referring to large emerging agricultural countries such as Brazil and Argentina who have played a pioneering role in the dissemination of no-till farming. Thus, by problematizing tillage, direct-seeding promoters made ploughing a passage point to be avoided, a technique to be abandoned by farming actors if they wanted to continue as agricultural professionals working with good soil. Becoming a non-plougher was presented as the opportunity to enter a new era of modern technology, both ecologically and economically, as old and degrading precepts were left to one side.

Making the risk visible, audible or palpable is a way of making it real and present and of taking the necessary measures to make its causes disappear. This is also the case in the fight against smoking, where the risk of disease is directly portrayed on cigarette packets with a photo of the damage caused to smokers’ organs. The same process is reflected in criticism targeting producer-consumer intermediaries. Supporters of
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short distribution channels accuse such middlemen of taking too big a cut, which results in producers earning little money for their efforts and consumers having to pay a high price for their products. The example of livestock farming might also be quoted here (Bernard de Raymond, 2013). ‘Field-crop farmers’ are portrayed negatively owing to the fact that they have ceased to breed livestock.

With these examples, we show that innovation not only consists in the extension of a sociotechnical network but also the withdrawal of an entity or the breaking up of ties (detachment), which brings about a rearrangement of the associated configuration.

5.2.2 Resistance to Withdrawal and New Stimulus for Innovation

Showing the risks or the causes of certain problems does not readily lead to the withdrawal of the accused entity. This is because the entity is associated with many others, including organization and routines, hence forming a stabilized configuration. Convincing farmers not to till their land or to stop using pesticides is challenging given the existence of counter-arguments, professional norms and economic risks, and the question of accessing technical knowledge about alternative solutions. The withdrawal of cars from cities involves designing and creating new infrastructures, at least to control circulation, and offering alternative modes of transportation. Reducing nuclear power calls for innovative energy-producing means as well as industrial policies. Withdrawal can be complicated by previous lock-ins and technological trajectories (Cowan, 1990). Reducing health and environmental risks requires other risks to be handled, such as the social, economic or political risks associated with employment loss or unpopularity.

Withdrawal, therefore, can come up against resistance and lead to controversies sparked by competition between different risks. The opponents of withdrawal specifically home in on risks thought forgotten, risks supposedly evacuated through the very technologies targeted for removal. For example, in the case of pesticides, those arguing against their removal emphasize the fact that they have made it possible to increase the yields of agricultural crops. When agricultural movements have advocated the removal of pesticides and promoted organic farming, counter-criticism has emerged, focusing not on the chemical danger but the potential resurgence of the pre-industrial risk of global hunger and food insecurity. In other words, concern about the management of post-industrial risks, and the disqualification of agro-industrial sociotechnical arrangements, is countered by the danger of the return of pre-industrial risks. The controversies in the health field concerning the withdrawal of vaccines are
similar: the risks of non-vaccination are balanced against the threat of a disease re-emerging, formerly eradicated through systematic immunization campaigns. Regarding the digitization of cultural heritage, one of the controversies centres on the risk of losing part of our heritage as data are moved from one standard to another every time the formats change.

Removal is thus a difficult process to implement. The criticism and disqualification of certain substances or technologies with the aim of removing them is countered by arguments in defence of their qualities and virtues. Many technologies are at the core of controversies about their supposed benefits and dangers: asbestos, mobile phones, nanotechnology (Macnaghten et al., 2005), GMOs (Bonneuil et al., 2008) and genetically modified food (Klintman, 2002). These controversies can last a long time before a withdrawal is brought about. They involve a wide range of actors who are divided about the withdrawal of certain technologies. The controversies offer a way of measuring the resilience and adaptation of existing sociotechnical arrangements that have been previously assembled and stabilized and then maintained and constantly improved in order to cope with the emergence of new elements and critics, such as those advocating the removal of solutions taken for granted. Some arrangements deal with established practices, rooted in the law and/or ancient traditions, and potentially powerful actors like the State, large industrial companies or professions. These actors try to maintain the connections holding the arrangements together, organizing counter-mobilization efforts with the aim of discrediting critics and easing the pressure exerted on threatened components. Tobacco and greenhouse gases (Oreskes and Conway, 2010) or salt in the food industry (Déplaude, 2014) provide examples of entities targeted. Those in favour of maintaining entities or practices also act by improving products or processes or by finding substitutes for them, in short by innovating.

5.2.3 Forms of Withdrawal and the Underlying Process

Innovation through withdrawal therefore involves criticism, disqualification or controversy. A novelty is never produced out of thin air but is built on previous elements. Removing an established thing involves a rearrangement of work, negotiation and transformation. We have seen that withdrawal involves the problematization of the item to be removed, leading actors to feel the need to be freed of that item. Consumers buy less fatty or additive-free food because the food substances challenged through this new purchasing behaviour have been caught up in delegitimization dynamics. Bringing the entity to be withdrawn into the limelight and associating it with negative qualities is part of the preparation process for withdrawal.
The proposed change, on the other hand, is classified as a positive action for health, nature or something else, or it is portrayed as a rapprochement between remote entities resulting from disintermediation.

Withdrawal can take different forms. These can be seen in the transformation of sociotechnical configurations, including the rhetoric of the actors concerned, and in the new devices or institutions for governing reduction or elimination. Banning is a key enabler of removal: banning tobacco or the car in the city are institutionalized measures for aligning individual conduct. This kind of initiative shows how entities or practices considered legitimate, and positively connotated or simply admitted, one day can become intolerable options the next. The prohibition of spitting in the street accompanied by the withdrawal of spittoons, or the ban on smoking in certain places, are examples of such initiatives.

Hence, withdrawal often takes the form of disintermediation followed by an attempt at reconnection: in this case, the removal of an actor or an intermediary object (Vinc, 2012) considered harmful is promoted to facilitate the rapprochement between two previously remote entities. This is the case of short distribution channels, designed to link producers and buyers directly and bypass middlemen; the latter are accused of retaining a significant share of the economic value chain and their removal is advocated in order to bring consumers and producers closer together. In the food sector, this aspect of closeness is fundamental: contact with local farmers embodying their terroir (local land and soil) and contact with nature are valued elements. The iconography built around this mode of consumption reflects this rapprochement, with pictures showing producers and consumers exchanging goods and money.

This is also the case with the withdrawal of certain techniques used in production activities, such as ploughing in agriculture. As far as the advocates of no-till agriculture are concerned, the removal of such techniques is a way of bringing producers closer to their land, reconnecting them with the natural functioning of its soil and, in so doing, allowing sustainable agricultural systems to be developed. With the digital humanities, the term ‘unbound’ refers not only to paper and books but also to the institutions (universities, libraries, archives, churches and so on), which used to exercise a degree of control over them. Disintermediation, whether human or technical, makes it possible to rediscover lost items or processes. Items that existed in the past and were considered a source of inspiration and wisdom are remobilized to imagine a future that is more sustainable, positive, authentic, transparent or just. Non-use of techniques has become a sign of quality: thus, ‘handmade’ products are made to stand out and ‘direct’ practices are valued. Some examples of the latter are direct seeding, direct sales, direct banking, open and unlimited access to data.
and even live broadcasting of television programmes, which are made to stand out through a message on the TV screen suggesting to the viewer that such programmes are more authentic and less susceptible to the wiles of change than pre-recorded programmes. Unaltered photos in women’s magazines reflect the same logic: the raw material, which is free from additions or touch-ups, is considered to be of superior quality. Nature, whether activated or stimulated, is considered preferable to the action of intermediaries, for example, auxiliary crop insects instead of chemical inputs, the body’s natural defences instead of vaccines, contraception based on better self-knowledge of the human body instead of the pill are part of this logic.

The same applies to breastfeeding, advocated instead of infant formulas and baby bottles containing BPA (bisphenol A). Breastfeeding is positively associated with a renewed relationship between the bodies of mother and child, and to natural processes that are alternatives to the use of technical intermediaries. In the case of no-tillage, we showed that the various detachment processes are concomitant with new attachment processes.

Thus, while withdrawal is associated with the words ‘no’, ‘without’ or ‘less’, it also requires the actantialization of certain entities (which means a narrative treatment of them), or even the introduction of new features that make it possible. The withdrawal of something leaves a gap in the sociotechnical network. Alongside the redefinition and rearrangement of certain entities, new entities are introduced, contributing sometimes to replace the withdrawn element. For example, the gradual withdrawal of plastic bags in supermarkets involves the development of canvas bags, and sometimes calls for the artwork of creators. The withdrawal of cars from town centres stresses the development of new forms of public transport, just as the withdrawal of nuclear energy leads to the expansion of renewable energies. In the case of no-tillage, farmers have been able to detach themselves from ploughing with the use of herbicides to replace the mechanical destruction of weeds. Similarly, direct seed drills have allowed them to sow crops without prior ploughing and the use of earthworms and a greater focus on the biological activity of soil has rendered ‘biological ploughing’ possible. A similar process can be seen in pesticide withdrawal: the non-use of these products has led farmers to develop new knowledge and skills relating to biological processes and natural predators, and chemical industries to develop alternative technologies such as biocontrol inputs.

When technologies are publicly recognized as a source of health-related or environmental risks, the pressure for their removal triggers a change in direction among traditional or emerging groups who strive to generate alternative solutions and create new relationships, markets and narratives in order to justify the withdrawal of old technologies and the promises they embodied (Audetat et al., 2015).
Not only does withdrawal require the redefinition of previous entities and the rearrangement of their configuration, which necessitates exploration, experimentation and production of new knowledge, it is also generally associated with the design and introduction of new artefacts, practices and organizations. However, their introduction is not the key structuring process of this kind of innovation; the key process is reduction, destruction or withdrawal. Both processes of withdrawal and introduction must thus be considered symmetrically in order to understand innovation dynamics.

5.3 CONCLUSION: THE REASONS FOR ADDITION OR CREATION BIAS, AND THE MERITS OF STUDYING WITHDRAWAL

The literature on innovation shows that there is an ‘introduction-of-something’ bias. Even though some authors have introduced notions such as creative destruction or detachment, theorists have neglected to look into the destruction and withdrawal aspects in detail. These are treated as secondary consequences. However, withdrawal also appears to be constitutive of innovation dynamics and even a driver for innovation.

In this chapter, we have highlighted innovation through withdrawal. The withdrawal process is based on complex dynamics entailing delegitimization, disqualification and dissociation, all of which can lead to controversy. The elements to be withdrawn are associated with entities or properties that are criticized or devalued and portrayed as incurring risks. Detachment does not evolve from nowhere; it is the result of work and a series of operations whose outcome is uncertain. Detachment and withdrawal also involve making these entities visible and reclassifying them; they are valued and associated with new roles, while at the same time new entities might be discreetly introduced. These innovations revolve around withdrawal, which needs to be thought of as a key element of the innovation process. In other words, it provides the basis for a change that may or may not be adopted and taken up by different actors. The expansion of withdrawal in different areas, in speeches, labels and practices, offers an interesting range of situations from which lessons can be learnt about this other kind of innovation. The growth of innovation through withdrawal provides some ideal situations for the observation of the transformations driving our societies. After a modernist period marked by the introduction of multiple new products, the current period is seeing the development of withdrawal and its associated transformations. These are not simply flashbacks but new arrangements to be built, tested, evaluated, regulated and maintained. Hence, a yet unexplored field of research has opened up as the
realities tied to the withdrawal of vaccines, pesticides, commercial middle-
men and technologies are played out.

However, few authors are looking into destruction or withdrawal as a component, a process, a driver or even as a strategy for innovation. This may be related to dominant cultural values in contemporary society, where creativity and novelty are valued and associated with the introduction of something new. So, the destruction or withdrawal of something is overlooked or even associated with a negative value, including by scholars who automatically see the introduction of something new as a good thing. Although there are social movements in favour of things marked as ‘X-free’ (GMO, preservatives, paraben and so on), ‘zero’ (increase) and ‘slow’ (science, innovation, food), such things continue to be associated with negative values. This association may limit the urge to develop studies on, and in favour of, withdrawal and destruction. Furthermore, this trend is also supported by the dominant discourse presenting innovation as the introduction of something on the market, the generation of economic value and commercial success. The withdrawal of a product appears as a failure. If scholars do not distance themselves from this ideology, theories of innovation will only be concerned with the ways to prevent withdrawal and how firms can derive benefit from their innovation. Destruction and withdrawal are too rarely studied and not even viewed as a solution to problems.

Maybe there are also some differences between disciplines. Innovation theories are mainly developed in economics and management, which are partly geared towards industry. They focus on the understanding of processes, policies and strategies to support innovation and economic dynamics leading to market and commercial success. They help in trying to overcome resistance to novelty, not in supporting the withdrawal or the destruction of something. Unlike economics and management specialists, anthropologists and sociologists are among the scholars who are sensitive to destruction from both a cultural and social point of view. However, while they do study the effects of innovation on society and thus question novelty, even contributing to the criticism of certain novelties, their investigations rarely focus on the withdrawal of something. When they favour withdrawal, it is the withdrawal of a novelty, not the withdrawal of something well established. The sociology of innovation itself has been compromised by the dominance of pro-innovation actors and scholars. It is thus time for scholars, whatever their discipline, to take a more serious look at destruction and withdrawal as innovation processes.
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