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40. Responsible management of innovation in business

Thomas B. Long, Edurne Iñigo and Vincent Blok

INTRODUCTION

Innovation is a powerful phenomenon, providing new products and services to society, raising living standards, and developing solutions to societal challenges, such as food security and climate change (Leach et al., 2012). Innovation also plays a key role in business competitiveness. Innovation provides new services and products, and can provide managers with new ways of managing and running the needed supportive structures that allow businesses to operate (Birkinshaw et al., 2008). These factors make the management of innovation an important activity. The potential for innovation to provide solutions to societal challenges, like an ageing population or climate change, explains why it receives much government support as well. The transformative potential of innovation can come with unexpected costs. For instance, innovations may provide economic benefits, and if designed correctly, environmental and social value too. However, there may be socio-ethical concerns and questions as well, especially where innovations operate at the edge of social desirability and ethical acceptability – which can raise important questions of responsibility and legitimacy.

Smart farming innovations, for example, such as novel sensor technologies, big data and GPS can greatly improve the productivity of livestock farming by increasing the size of herd that can easily be managed. They can also provide environmental returns by improving the management abilities of farmers, reducing input and enhancing efficiency. So, these technologies can provide benefits for business (productivity), society (food security) and the environment (lower impacts). Yet these same technologies create socio-ethical issues and concerns in society. For instance, they change the role of farmers, enable the further industrialisation of agriculture, and can involve the collection of large quantities of data, which raises questions linked to data protection, privacy and ownership (Carbonell, 2016). These effects can raise serious concerns among users and wider society (Blok & Long, 2016; Bos & Munnichs, 2016), creating what are in effect socio-ethical barriers, potentially limiting innovation adoption.

As the twentieth century advanced and we entered the twenty-first century it became increasingly clear that the ability of innovation to provide benefits comes with the potential to harm (Groves, 2006; Jonas, 1985). This highlights the need for ways to better manage innovation in line with societal demands (Stilgoe et al., 2014; Burget et al., 2017). This means managers face new demands to be aware of and manage socio-ethical issues. These demands will primarily fall on those managers with functions that influence innovation. However, ‘mainstream’ managers will also be faced with these issues, as they are called to contribute to innovation processes or try and implement innovative products, services, or new management techniques (Laasch & Conaway, 2015).

The current responsible management literature does not provide a specific vision of how responsible management applies to innovation. We use this chapter to argue that the concept

and practice of responsible innovation may be able to provide specific guidance. We envisage that this guidance would be valuable to those wishing to specialise or focus on the management of innovation. However, it is also likely that the themes and principles covered in this chapter are also relevant to more mainstream and generalist managers. As innovation has increased in importance for business, and wider society, the functions that are involved in innovation have broadened. Generalist managers are likely to require at least an understanding of the key issues involved in ‘responsible innovation’, even where they are not directly involved in day-to-day issues. For instance, recent research found that the decision making process for responsible innovation is not taken at the operational level but at the strategic level (Blok et al., 2017). This demonstrates how general managers and higher-level decision-makers are involved in decisions that have implications for socio-ethical issues and why these functions are important for responsible innovation in industry contexts.

An innovation manager’s influence goes beyond the innovation process and its outcomes – whether this be a new technology, product, service or business model. We build from responsible management thinking on managerial spheres of influence (Laasch, 2014). Every manager has influence, yet the influence depends on its strength and reach is dependent upon the manager’s position and role. For instance, managers can easily effect changes in their direct sphere of influence. Front-line managers can install responsibility, ethics and sustainability into their teams. Senior managers, with influence and control over strategy, have more power to create responsible companies, which in turn may create pressure on competitors and other industry actors to become more responsible themselves.

The specific responsibilities that managers hold can be viewed in different ways, which will influence how responsible innovation applies. In a wider sense, managers (innovation managers included), can be considered custodians of some of society’s most dynamic and influential organisations. Managers must be aware of this influence and be willing to implement and consider these principles in their day-to-day responsibilities (Prahalad, 2010). On the other hand, some scholars argue how awareness and ‘good faith’ alone will not lead to effective behaviour change or practice (Hibbert & Cunliffe, 2015). Responsibility is about an appreciation of the importance of process and the general mind-set that a manager holds in relation to their work – in the case of Hibbert and Cunliffe (2015), this takes the form of critical reflection and reflexivity – which, as we will see, are key components in a responsible management of innovation approach – which means appreciating the nuances and subtleties of many socio-ethical issues in innovation management situations, alongside key moral values (Nonet et al., 2016).

This influence is potentially more profound when managing innovation processes. Innovations have the potential to provide not just new products and services, but also new organisational models and even new socio-technical systems. Within this context, innovation managers wield potentially significant influence through their impact on innovations.

In the remainder of this chapter, we explore the concept and practice of responsible innovation by examining current literature and drawing on the authors’ own experiences. We focus on individual responsible innovation managers, before considering how organisational and system-level factors play a role.

RESPONSIBLE INNOVATION – ORIGINS AND EMERGENCE

Responsible innovations should help solve societal grand challenges, such as food security or clean efficient transport (Owen et al., 2013), while also avoiding possible unforeseen negative consequences, that can result from innovation (Liebert & Schmidt, 2010; Hacking, 1983). Responsible innovation responds to the failure of market forces to provide sufficient solutions to complex societal challenges and the inability of retrospective regulations to manage risks posed by radical innovations effectively.

To address societal demands in terms of attaining the right impacts, and business demands for enhanced innovation processes and reduced risk, responsible innovation advocates integrating socio-ethical factors into innovations and the processes that are used to develop them. Management of socio-ethical issues involves anticipating future (negative) impacts, second-order reflection on the purpose of the innovation and the interests involved, and inclusive deliberation (Owen et al., 2013; van den Hoven et al., 2014; Von Schomberg, 2013). Responsible innovation is widely defined as (Von Schomberg, 2013: 39):

[A] transparent, interactive process by which societal actor and innovators become mutually responsive to each other with a view to the (ethical) acceptability sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society).

The conceptual and practical development of responsible innovation has drawn on a range of disciplines, including corporate social responsibility, technology assessment, and more broadly, science and technology studies. Established practices and techniques from these disciplines have been incorporated into responsible innovation. For instance, stakeholder inclusion is a widely recommended action in innovation, sustainability and responsibility domains (Rühli et al., 2017), while deliberations have previously been recognised to improve and deepen understanding of critical issues (Voegtlin and Scherer 2017). The use of co-creation has been observed in the development of innovations for climate-smart agriculture in the Netherlands (Blok & Long, 2016), and in terms of the Dutch food industry (Blok et al., 2015). More widely, activities such as scenario thinking, crowdsourcing, third party critical appraisal, and a self-assessment culture are identifiable (Lubberink et al., 2017). A non-exhaustive list is presented in Table 40.1.

While these activities often represent ‘best practice’ more widely, their use to manage socio-ethical issues for responsible innovation makes them distinct in several ways. First, responsible innovation assumes that unintended consequences are probable, not just possible. Second, responsible innovation aims to ensure that the outcomes of the innovation process help to solve societal grand challenges; and third, while all innovation managers strive to limit risks and enhance the success of innovations, responsible innovation management places an explicit emphasis on the role of socio-ethical factors.

Responsible innovation has established itself as a widely applicable umbrella concept for a range of practices that seek to enhance the integration and management of socio-ethical factors into innovation processes (Grunwald, 2011). European Union support of the concept, in terms of integrating responsible research and innovation into its research and innovation programmes, has played a large part in the concepts current reach. Responsible innovation within this context is seen to be consistent with the European Union’s aim of encouraging economically profitable innovations that simultaneously alleviate societal challenges in a way

Table 40.1 Actions for implementing responsible innovation

Dimension	Tools
Anticipation	Scenario thinking
	Value mapping
	Ideation for business modelling
	Translating vision into mission (target setting)
	Game theory/perspective
	Crowdsourcing
	Crowdsourcing (via software)
	Living lab structures
	Collaborative business modelling
	Partnerships
Inclusion and deliberation	Consultancy of experts
	Focus groups
	Integrating views and opinions
	Formal evaluations
	Third party critical appraisal
	Informal (self-) assessment culture
Reflexiveness	'Knowledge -concept-process' mechanisms
	Empowered and open communication
	Customising or mainstreaming
	Preventing organisational inertia
Responsiveness	Adjust/withdraw innovation
	Monitor external environment post introducing of innovation

Sources: Adapted from Lubberink et al. (2017); Burget et al. (2017); Blok et al. (2015); Long and Blok (2017).

that maximises societal acceptance and embeddedness (Von Schomberg, 2013). The European Union articulates responsible innovation through key principles, focusing on outcomes, such as gender, open access research or science education (Ruggiu 2015; Von Schomberg 2013).

Governance frameworks that are more focused on the innovation process have also been widely used; the most common one highlights four key dimensions, including anticipation, inclusive deliberation, reflexivity, and responsiveness (Stilgoe et al., 2013).

Anticipation requires that innovators consider 'what if ...' questions. Such questioning is important as it helps to ensure that innovators are open to numerous possible outcomes and think systematically about possible impacts. This type of exploration of possibilities is required because of the inherent unpredictability and uncertainty associated with innovation processes.

Inclusive deliberation aims to include a diverse set of societal stakeholders in the innovation process, through deliberative discussions concerning the aims and potential impacts of the innovation. Inclusivity and deliberation are often used interchangeably; however, they have a somewhat different emphasis. Inclusivity focuses on whom to include, while deliberation emphasises the need for thoughtful and open forms of discussion and communication (Lubberink et al., 2017).

Reflexivity focuses on questioning and exploring the moral boundaries and roles of innovators. This involves the ability to self-critique your own assumptions and to reflect on how key issues are framed and thought about. The fourth and final dimension, responsiveness,

seeks to ensure that the necessary resources and capabilities are available in order to respond effectively to any issue raised through the articulation of the other dimensions.

An alternative framework examines socio-ethical issues in innovation in terms of purpose, process, and product (Stahl et al., 2017). Purpose considers the rationale behind the development of an innovation, including awareness of potential impacts. Process examines the activities undertaken. This aspect links clearly to the above highlighted responsible innovation dimensions (Owen et al., 2013; Stilgoe et al., 2013). The product category refers to the outcomes of the innovation process, drawing comparison with the European Union's approach.

Innovation occurs in many contexts, meaning responsible innovation is applicable to a variety of settings. These range from academic and research environments to profit-orientated industry contexts. Responsible innovation may not just improve outcomes for society, but may also benefit innovators themselves. For instance, responsible innovation can lower risks and enhance social legitimacy (Husted and de Jesus Salazar, 2006), while evidence is emerging that increased socio-ethical responsibility can enhance innovation processes and outcomes, societal acceptance and embeddedness (Haney, 2017). Responsible innovation can improve relations with government, regulators and society at large. Indeed, many of the activities inherent within responsible innovation would be effective business responses to trends such as increasing consumer expectations and the increased scrutiny businesses and organisations are under (Brusoni & Vaccaro, 2017; Liebert & Schmidt, 2010).

Managing socio-ethical factors can involve challenges however. The novelty of responsible innovation means that many actors are unfamiliar with the idea and its key concepts (Chatfield et al., 2017; Stahl et al., 2017). While examples and case studies do exist, responsible innovation is not yet a widely practised management approach. A further challenge lies in the potential for conflicts between the economic goals of innovators and the socio-ethical aims introduced by responsible innovation. Stakeholder engagement and integration of societal perspectives into innovation may provide intangible and long-term benefits, but these can be hard to measure, while the costs, in terms of time and money, are more obvious and immediately apparent on balance sheets. This means economically orientated stakeholders, such as investors, may hesitate to fund responsible innovation activities, especially where short-term returns are emphasised (Schaltegger & Wagner, 2011). A further challenge concerns the management of the goals, expectations and values of a diverse set of stakeholders (Blok & Lemmens, 2015; Blok et al., 2015). Difficulties are also likely in terms of achieving transparency requirements with the need for asymmetric information to obtain a competitive advantage in industry (Garst et al., 2017; Blok & Lemmens, 2015).

In the following sections, we will consider how responsible innovation applies to the responsible manager.

THE RESPONSIBLE INNOVATION MANAGER

This section charts the perspective of the individual manager. We explore the process through which an innovation manager deals with socio-ethical factors, as well as the challenges that these managers can face. Responsibility, sustainability and ethics principles are critical for decision-makers who engage with and control innovation. It is the views, values and aspirations of individuals that are often cited as driving responsible management actions. Decision-makers engage in a complex process, with a range of factors influencing how issues

are perceived, through to how they are managed. Responsible management of innovation is not just relevant to decision-makers – we argue that these principles are important for all individuals working within innovation teams (Verkerk et al., 2001). Every individual within an innovation team, or indeed, with links to innovation functions, is likely to be able to influence (intentionally or unintentionally) the process and product – even if only in a small way. However, even small influences and changes have the potential to add up – and as such, all individuals need to be equipped with the awareness and skills needed to implement responsible innovation and ‘manage’ their own interaction with the innovation process. All employees and managers, no matter their level, bear responsibility. For instance, think of the engineer managing the design of a small component of a new car. While following the design and specification handed down from above, they still have influence and responsibility – and the ability to positively and negatively influence the outcome. Following this argument, we consider the factors and processes relevant to the individual.

Sustainable entrepreneurs developing new technology-based firms represent an interesting context for exploring how socio-ethical factors are managed in innovation processes. Sustainable entrepreneurs are a force for change, helping to solve societal challenges by developing innovations and bringing them to the market. Sustainable entrepreneurs recognise, develop and exploit opportunities to create goods and services which provide economic, social and ecological gains (Belz & Binder, 2017). Much like with innovations, the inventive nature of entrepreneurship means many aspects of the process take on ethical significance (McVea, 2009; Roloff, 2008). The choices faced by sustainable entrepreneurs are often challenging as they must be made within a context of uncertainty and time pressure, due to the nature of the entrepreneurial process (McVea 2009; Marshall 1999; Morris et al., 2002). We explored how sustainable entrepreneurs managed and integrated socio-ethical factors into their innovations, and what factors played a role.

The decisions faced by sustainable entrepreneurs are distinct from purely commercial decisions taken by other entrepreneurs. Decisions on sustainability involve a complex set of social, environmental and economic factors, that often need balancing in order to achieve sustainable outcomes (Muñoz, 2018). As such, the decisions taken by sustainable entrepreneurs in relation to their innovations can be seen as ethical decisions, which are subject to a specific ethical decision-making process (Jones, 1991)

Sustainable entrepreneurs can make ethical decisions in a number of ways. They can: (1) apply and use moral theories, for instance, utilitarianism; (2) reason according to the moral intensity of an issue (consider the consequences of the decision); or (3) use trial and error (Sonenshein, 2007; Sarasvathy, 2001). It is likely however that entrepreneurs use a mix of these approaches, rather than applying a codified approach (Busenitz & Barney, 1997). The theories behind these methods suggest that having an awareness of socio-ethical factors (the moral issues) is the critical first step in the process of ethical behaviour (Jones, 1991), and is the key difference to standard decision-making models (Woiceshyn, 2011).

The process of ethical-decision making can be split into four distinct stages (Crane et al., 2019; Jones 1991), covering (1) recognition of the moral issues; (2) the making of a moral judgement; (3) establishing moral intent and (4) engaging in the moral behaviour.

A range of factors affects the ethical decision-making process, and so in turn, how and whether socio-ethical factors are managed. For instance, the moral sensitivity of an individual entrepreneur will influence their ability to recognise the moral element of a decision. Moral sensitivity describes an entrepreneur’s ability to recognise and consider potential ethical

implications in a decision. Low moral sensitivity makes it difficult for a manager to understand different stakeholder perspectives or the impacts that a particular action may have (Buchholz & Rosenthal, 2005). Factors such as the moral development of the entrepreneur and their particular values and beliefs are particularly influential when making moral judgements, the second stage in a moral decision-making process. Moral imagination, a further key factor, allows individuals to move beyond the use of simple rules-based decision-making. Moral imagination enhances the identification and development of solutions, while also enabling the anticipation of potential solutions (McVea, 2009; Buchholz & Rosenthal, 2005).

Recognising socio-ethical issues and holding capabilities, such as moral imagination or sensitivity, are necessary, but often not sufficient for managing socio-ethical issues. Indeed, even where there is awareness and the competencies needed to identify ethical issues in an innovation process, an awareness-action gap can exist (Hibbert & Cunliffe, 2015). This can be explained where individual managers often face a range of barriers. These can include the influence of stakeholders or the limits of available technologies. Research on responsible innovation in the ICT industry found that resources, such as time and money, were key restricting factors (Chatfield et al., 2017).

A responsible innovation manager also faces the challenge of solving societal challenges while remaining financially viable in commercial contexts (Hahn et al., 2010). While these challenges can occur at the organisational and strategic level, our research focused on how individual sustainable entrepreneurs responded. Within innovation contexts, tensions are likely to go beyond classic business society pressures. Specific socio-ethical issues may also conflict with each other – for instance, due to the novel and technical nature of many innovations focused on solving societal problems. Think of tensions between new, novel, efficient and climate-smart food production techniques and consumer worries over Frankenstein foods and a desire for traditional farming techniques. This places the innovation manager in a difficult position – having to manage competing socio-ethical issues – in this case food security versus legitimate societal desires.

Many of the factors and processes related to how sustainable entrepreneurs manage socio-ethical issues in innovation processes are also relevant to other contexts. For instance, innovation managers within more corporate settings are likely to face similar challenges and operate in comparable ways. An innovation manager in a large company will still go through an ethical decision-making process, although organisational-level factors may play a larger role, compared to a lone sustainable entrepreneur at the start-up stage. Both types of innovation manager may be trying to incorporate responsibility orientated (socio-ethical) factors into their innovations, within financial constraints.

Research focused on innovation by social entrepreneurs shows us that individuals manage socio-ethical factors in very different ways. Lubberink et al. (2018) observed that rather than using all responsible innovation dimensions, such as anticipation, inclusivity, and so on, many innovators in practice focus on just one or two. A typology of different innovators was developed, including for instance, ‘rushing innovators’, who were more anticipatory, working in a focused way on a social problem, with little involvement of other actors, and in a less transparent innovation process. This research shows that there are potentially many types of responsible innovation managers and individual differences in terms of motivation and practices will result in different approaches.

We have shown in this section that responsible innovation is heavily influenced by individual-level factors. We also discover, however, that many factors beyond the individual

innovation manager influence responsible innovation. For instance, as an enterprise develops and grows, it seeks legitimacy from key stakeholders. At this point the entrepreneur's own values are balanced against the demands and values of other actors (O'Neil & Ucbasaran, 2016; Ploum et al., 2018). In the following sections, we move on to consider how organisations and the systems they operate in influence responsible innovation.

RESPONSIBLE INNOVATION IN ORGANISATIONS

Innovation is a key organisational function, upon which businesses and organisations are reliant. Much innovation takes place within large and complex organisations, employing many innovation managers, working on large and complex projects. Within these contexts, innovation management is an organisational-level competence, and is subject to high-level management and design. This view of innovation management helps to show how innovation managers, in large or small organisations, will be subject to a variety of influences emanating from the organisation.

Firm-level drivers and motivations are one set of variables that are likely to influence individual innovation managers. The motivations of a firm, whether they be instrumental, moral or relational are likely to be distilled into organisational culture and effect how individual managers discharge their own responsibilities. If a firm has an instrumental approach to the management of socio-ethical issues, this is likely to filter down to the approach of individual innovation managers (Windolph et al., 2013).

The developmental stage and age of an organisation will also influence the management of socio-ethical factors. A founding entrepreneur will tend to dominate a young start-up enterprise. In this context, decision-making will be more contingent on the founding entrepreneur as an individual. Their values, beliefs and practices will be highly influential in how the innovation process progresses. This is potentially beneficial, where the founding entrepreneur holds the necessary competencies, skills and motivations. However, what if the founding entrepreneur does not value socio-ethical factors, or lacks the necessary competencies to recognise and then manage these issues? As the company grows, more individuals will be involved in decisions and develop specific procedures or processes. External stakeholders may also become more influential as a firm grows and matures (Morris et al., 2002). As more individuals become involved, processes and procedures are codified and the influence of any one individual is diluted.

The innovation strategy that an organisation pursues is also likely to impact on how an individual innovation manager is able to manage socio-ethical factors. One way to view innovation strategies of firms is to consider the degree to which they focus on internal knowledge and competencies versus the extent a firm is open to the use of knowledge or expertise outside of the organisation. The internal focus is considered a more traditional mode of innovation, whereas a focus on using all available knowledge (including knowledge that exists outside of the organisation) is increasingly becoming the dominant innovation paradigm – known as open innovation (Chesbrough, 2010). This strategy seeks to maximise the utility of information flowing in and out of a business. Inbound information flows can be used for the development of innovations, for instance, while outbound flows can be monetised via licencing.

Inbound information flows are associated with the search for useful external information, and include actions such as buying patents and licences, innovation competitions, co-creation

and crowdsourcing. Outbound open innovation is more focused on selling patents or licences, or joint-venture activities (Chesbrough & Brunswicker, 2013). These actions and the overall strategy of open innovation are focused on improving competitive advantage, showing how the reasoning behind their use is wholly instrumental. These approaches are also likely to influence how individual managers manage socio-ethical factors.

Recent research, exploring the extent to which responsible innovation and open innovation could be compatible, found that many inbound open innovation activities were complimentary to responsible innovation dimensions (Long & Blok, 2017). This research focused on the innovation strategies and actions of high-tech agri-food start-ups in the Netherlands. They found that co-creation activities – where a firm develops an innovation in close cooperation with users – were able to facilitate anticipation, responsiveness and inclusivity dimensions. While industry engagement, in the form of involvement with incubators or competitive business support programmes, could facilitate all four dimensions of responsible innovation. The research results came with the caveat that the management of socio-ethical issues through open innovation requires sensitivity to socio-ethical factors and the existence of strategic drivers (Long & Blok, 2017; Garst et al., 2017), probably through senior management support. However, it demonstrates how a specific innovation strategy can introduce activities that are consistent with responsible innovation dimensions.

Where open innovation strategies were not undertaken, and a more closed innovation strategy was used, it is possible to imagine that an innovation manager would be restricted in their ability to practise certain aspects of responsible innovation. For instance, while a closed innovation strategy would not remove the potential to consider and attempt to anticipate potential future consequences, it would reduce the ability to consult widely and include a diverse set of societal stakeholders.

This section has highlighted how organisational level factors can influence how managers deal with socio-ethical issues in an innovation process. Potential factors included the age and size of an organisation, as well as its overall innovation strategy. Next, we raise the level of analysis to consider how system level aspects may influence the management of socio-ethical issues.

RESPONSIBLE INNOVATION AND THE SYSTEM

Innovation emerges from a network of interrelationships within individuals, organisations and institutions, normally by the integration of different ideas and practices, which shows that the innovation process itself can be considered as a system (van de Ven et al., 2008) embedded in organisational, economic, social and natural systems. The relationship of such systems with responsible innovation has not been widely discussed in the literature, even if stakeholder management and awareness of, and responsiveness to, societal expectations of innovation are cornerstones of responsible innovation. Elements of different nature intervene in the coming about of innovations, more so when socio-ethical and sustainability concerns are introduced in the innovation process, which requires strong collaborative and systemic components (Iñigo & Albareda, 2016).

Innovations have a profound effect on their surrounding environment, since they are capable of changing social practices and institutions: innovation is, as illustrated by Grinbaum and Groves (2013), a future-creating activity. This implies many forms of responsibility, when

we depart from the idea that the innovator is embedded in a system that she helps to shape: collective, individual, professional, role, moral, legal ... (Stahl et al., 2013). This ability to shape the system through innovation calls for responsibility of the managers involved in such developments. This responsibility, which boils down to the normative competence of the innovator, can be individual parental, meaning that the innovator of today is responsible for the people of tomorrow in the same way that the parent is responsible for the future of the child. In that sense, in its relationship with the wider system, the innovator shall have a set of virtues, as indicated before, which include seeking the right impacts, safety by design, and understanding the social nature of innovation (Grinbaum & Groves, 2013). However, in addition, the innovator has a collective political responsibility, associated with the aims she is trying to accomplish. Therefore, in considering the effects of innovation of future social practices, the innovator shall factor in the preferences of the social group; hence the importance of developing capabilities for responsible innovation.

In any case, the relationship between the system created by the innovation process itself and its surrounding system is not unidirectional. System factors and path dependencies also play a major role in the development of the innovation process, and the responsible innovator needs to understand and respond to these factors. Auer and Jarmai (2017) showed that there are six potential system factors affecting the adoption of responsible innovation practices: the regulatory framework, availability of financial resources, market orientation, customer knowledge, organisational structure, and knowledge among innovation partners. While some of these factors belong to the organisational level (for instance, market orientation or customer knowledge), they are strongly related to system factors. Hence, one task of the responsible innovator is to understand the different economic, socio-ethical, and natural environment factors that may affect the development of the innovation. To that extent, as we have seen before, there are some managerial capabilities (such as moral maturity and awareness), that are helpful. Thus, from a management point of view, it is relevant to look at the system surrounding organisations and the individuals that build them, since relational and awareness capabilities are key in dealing with socio-ethical issues in innovation.

Responsible innovation aims to improve the societal embeddedness of the innovator, for which stakeholder integration is essential (Blok et al., 2015; Long & Blok, 2017). In addition to the individual and organisational challenges, responsible innovation actors integrate socio-ethical issues with other system actors with whom they are co-dependent in achieving a common goal. As observed in the previous section, the integration of stakeholder values is important for the development of responsible innovations, both from an inbound (O'Neil & Ucbasaran, 2016; Ploum et al., 2018) and an outbound perspective, due to the collective political responsibility of the innovator (Grinbaum & Groves, 2013). Hence, a major tool in the relationship of the responsible innovator with the wider system will be stakeholder engagement, in order to better understand the drivers and interests of the societal actors that build the system and provide a more adequate response to them. Blok et al. (2015) signalled certain management practices that help in such stakeholder engagement; mainly, building trustful relationships and keeping an open culture, implementing formal and informal socialisation mechanisms, understanding, aligning and accepting different interests and potential conflicts, and developing co-responsibility. The latter implies the acceptance of the position of the innovator as part of a wider system by which she is swayed, but to which she can make significant contributions in conjunction to other players. Innovators are to maximise their contribution to the wider system when other stakeholders are working towards a similar goal, for which stake-

holder management is crucial. As an example, the success of the *Energiewende* (energy transition) in Germany does not only lie in bringing about more efficient technologies, but rather, in a government willing to create a regulatory and incentivising framework for renewable energy, and a large group of concerned consumers demanding the energy transition. Therefore, part of the role of the responsible innovator is to identify relevant actors and stakeholders in the system, and, beyond consultation, draw the wider picture in which the innovation and the different actors will create a new socio-technical system (Geels, 2010).

Nevertheless, there are limitations to the extent to which managers can respond effectively to system factors simply by developing relational capabilities. As noted by Auer and Jarmai (2017), the regulatory framework and the availability of financial resources are important system barriers to the adoption of responsible innovation practices. Despite anticipatory measures, these changes often affect a whole region or sector, and the innovator cannot factor them in beforehand. Therefore, also for responsible innovation it is important to cultivate long-term vision and resilience, which stems from an understanding of the innovator's role and position in its wider system. New research calls have been raised in this regard, with the aim of comprehending what role responsibility should play in the development of innovation systems and their regulatory frameworks (Schlaile et al., 2017). New methods for responsible innovation that take into consideration the reciprocal nature of the relationship between the innovation and its wider environment as well as the inherent uncertainty of innovation outcomes at a large scale (even with the adoption of anticipatory measures are necessary) (van de Poel et al., 2017). As for now, the acknowledgment of the responsibility as a system-builder acquired by the innovator is essential for the manager to hedge the changes in the system.

A FRAMEWORK OF RESPONSIBLE MANAGEMENT OF INNOVATION IN BUSINESS AND FUTURE CHALLENGES

In the preceding sections, we have explored the role and importance of innovation, the sphere of influence of innovation managers and described socio-ethical issues. Following this, we outlined the concept and practice of responsible innovation, and explored how it applied to individual innovation managers and the different factors that influenced how they could manage innovation responsibly.

We contribute by drawing together the different levels at which responsible innovation in business operates, to build a clearer picture able to identify the key factors and actors. We highlight key interlinkages between the different levels, such as how system levels factors influence the motivation of organisations and individuals to undertake responsible innovation.

Figure 40.1 shows how motivation and drivers act to trigger the management of socio-ethical factors. As shown, these factors can stimulate both individuals and the organisation they are part of. In turn, responsible innovation actions are executed; however, various individual, organisational or system-level factors influence how responsible innovation looks in practice. We show how drivers and motivations occur within both individuals but also organisations, and show that both individuals but also organisations carry out that responsible innovation. We further highlight that individual, organisational and system level factors influence the outcomes of responsible innovation efforts. For instance, individual innovation managers are likely to be personally impacted by reflexivity activities, especially where they seek to question underlying motivations or assumptions. Organisations will be impacted as the innovation

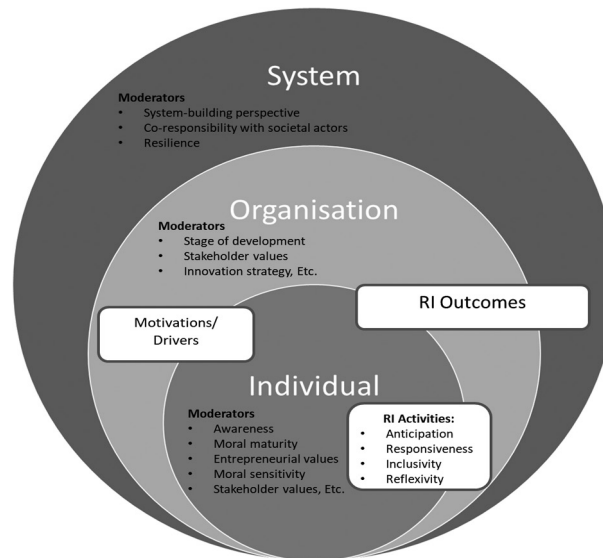


Figure 40.1 Model of responsible management of innovation

changes shape and is impacted by responsible innovation actions; organisations benefit via reduced risk and the improvements made to innovations, in terms of enhanced adoption, via the process. The system is also impacted, via the adoption of responsible innovation that helps to impact societal challenges.

FUTURE CHALLENGES AND A RESEARCH AGENDA FOR RESPONSIBLE MANAGEMENT OF INNOVATION

While responsible innovation holds much promise, in many contexts it is an aspiration rather than a reality. A key challenge therefore is to enhance the responsible management of innovation. Innovation managers are often inclined to focus on the commercial aspects of an innovation. However, early research and experience shows that responsible innovation can provide benefits. An evidence base is required to help strengthen arguments for the uptake of responsible innovation. This should include identifying the tangible and intangible benefits that responsible innovation is able to deliver, and the factors that are likely to influence positive outcomes. The highlighting of critical success factors, on a practical level, should enhance the development of an evidence base and best practice examples.

At the individual level, mainstreaming responsible innovation will also require education and tools. How best to teach future and practising managers about responsible innovation is an open question. In this respect, broader responsible management initiatives, such as the United Nations Principles for Responsible Management Education (PRME) are laudable, because they aim to help educators equip future managers with the skills needed to tackle societal challenges (Alcaraz and Thiruvattal, 2010; Godemann et al., 2014; Rasche and Escudero, 2009; Sobczak and Mukhi, 2016). How relevant they are for the specific issue of responsible management of innovation is less clear, however. These issues will become more pertinent

as responsible innovation starts to move from technology-focused R&D contexts, where technology assessment and risk management are more common, into newer sectors where tech development is less formalised (Stahl et al., 2017).

Even where individual managers are inclined and motivated to integrate socio-ethical factors into innovations, barriers may still be present. A key challenge that responsible innovation faces within competitive contexts is the issue of transparency. Many innovators worry about the imitation and theft of their ideas and intellectual property. Indeed, intellectual property is critical for firm future success and survival, meaning that such fears are well founded. This highlights a key paradox between moral (societal) concerns and the more instrumental realities of business (firm survival). How to manage this issue alongside the need for transparency and openness in responsible innovation is not a challenge that has been solved. The prominent role of stakeholders in responsible innovation processes can pose particular challenges to managers (Lubberink et al., 2017). For instance, how should managers deal with stakeholders who have dissimilar or even contrasting views? How can they be integrated into the innovation process in a constructive and useful way?

A particularly challenging case could involve investors. Investors can often be influential stakeholders, as they can hold the purse strings, especially in start-up and smaller innovation projects. How responsible innovation managers deal with and manage these stakeholders could have potentially profound impacts on the application of responsible innovation to the overall project. One can imagine projects where investors are not sympathetic to a responsible innovation approach, and rather, seek more short-term returns at the expense of responsibility, sustainability and ethics. The role of a responsible innovation manager in this context would be challenging – the development of tool kits for investor management as well as how to make responsible innovation projects attractive to investors would help to avoid these situations and help generate investment streams for responsible innovations.

At the organisational level, key questions could focus on the extent to which the responsible management of innovation is applicable to non-technological or soft innovation contexts. Many innovations are non-technological in nature, but can have equally profound effects, and are potentially subject to the same influences that make responsible innovation approaches so important in technological contexts.

One example would be ‘management innovations’, by which we mean the new management practice, process or structure which changes how management is performed (Birkinshaw et al., 2008). While technological innovation is more tangible, management innovation is often equally important to firm performance. Applying responsible innovation principles to management innovation could bring similar types of benefits that are experienced by technological innovations. This could include enhanced embeddedness and innovation adoption. Enhanced embeddedness is partly driven by improved user ‘buy-in’. This is because they are often included in the innovation process or at the least, the innovation has included their perspectives in its design. Management innovation success relies on credibility for diffusion in firms – applying a responsible innovation approach is likely to enhance credibility, improving adoption (Birkinshaw et al., 2008). Indeed, much research highlights that managers often seek progress and legitimate solution to their problems (Abrahamson, 1996) – a responsible innovation approach can help to provide these.

A further example of management innovations would be the case of business-model innovation, which has been instrumental in the emergence of many of today’s most influential and successful companies (Chesbrough, 2010). Think for example of Amazon or Uber. The

application of responsibility, sustainability and ethics principles to these innovation processes is arguably critical in order to minimise negative impacts and help ensure that societal actors have a say in how these developments are shaped. The importance of business models is emphasised in the role they are being given in developing sustainable solutions, through the alteration of the underlying logic of many organisations. These changes are important, providing the foundations upon which many solutions to sustainability issues will be based. In this context, responsible innovation is critical in order to ensure that solutions, at this organisational level, are responsible, sustainable and ethical. As such, future research should explore how responsible innovation interacts with ‘soft’ innovation processes, and if the same benefits are available.

System-level challenges in responsible innovation in business is still an under-researched area, despite the need to integrate and embed socio-ethical and environmental demands in the innovation process and outcome. Three main questions remain open for further research. The first one is related to the connection between the individuals and organisations with the system in which they operate: managerial innovations in business models help to connect the individual and the organisation with their surrounding system, connecting the internal aspects of organisation with the market and society. However, the question of how to embed the organisation as a proactive actor for socio-ethical concern (beyond consultation of stakeholders) is still to be answered. Second, the role of individual managers in such proactive management of socio-ethical issues in innovation is unclear. Beyond moral competence (Ploum et al., 2018), more research is needed about how the responsible manager can innovate its system in a socially desirable manner. While the role of the organisation as a ‘system builder’ has been further examined (Adams et al., 2016), the characterisation of the responsible manager who is not only swayed by the system, but is also an active contributor to the shaping of its structures, calls for further research. Third, research is starting to take steps on the management of responsible innovation in networks (Ceicyte and Petraite, 2018), but further studies on how responsible innovation operates in contexts where multiple actors participate directly or indirectly in the innovation process could open new research avenues.

Overall, further multi-level research that takes into consideration the interrelations between the individual, organisational and system levels is needed, since there are foundations for responsible innovation at each of these. Looking at the management of socio-ethical factors in innovation from the point of view of various stakeholders across the layers of complexity that each of these levels provide could help to obtain a richer view on the managerial elements needed to support responsible innovation.

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