Responsible Innovation in Industry

Learning from Social Entrepreneurship

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Propositions

1. Responsible innovation should not only include science and technological development but also other types of innovation.
   (this thesis)

2. Social entrepreneurs develop innovations that are not responsible innovations in a strict sense.
   (this thesis)

3. All investments in climate change mitigation should be dedicated to climate change adaptation.

4. Smart sustainable city systems violate citizens' right to the city as it is proposed by Lefebvre (1968).

5. Libraries need to update their science-fiction catalogue because many novels have become non-fictional.

6. Science is "top sports" that also comes with negative consequences.

Propositions belonging to the thesis, entitled

Responsible Innovation in Industry: Learning from Social Entrepreneurship

Rob Lubberink

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Abstract

Responsible innovation is a new approach to control and direct innovation towards an ethically acceptable, societally desirable and sustainable direction, which requires deliberative forms of stakeholder engagement upstream in the innovation process. However, it is questionable whether, and unknown how, this 'ideal' can be applied in a business context. This PhD thesis therefore aims to: 1) clarify the concept of responsible innovation so that it can hold for business contexts, and 2) to identify strategies for implementing responsible innovation in a business context in general, and an entrepreneurship context in particular.

The theoretical investigation starts with conceptual analyses to identify similarities and dissimilarities between responsible-, social- and sustainable innovation. This is complemented with a systematic literature review of 72 empirical articles to identify, analyse and synthesise responsible-, social- and sustainable innovation practices in a business context. Subsequently, a self-assessment questionnaire is developed for empirical investigation of *de facto* responsible innovation processes in a business context. The empirical part starts with an exploratory empirical study to identify and describe different typologies of innovation processes by 39 social entrepreneurs. This part is complemented with qualitative content analyses of 42 profile descriptions to identify successful strategies to integrate normative substantive values into innovation outcomes.

The results indicate that multiple conceptual similarities exist between responsible-, social- and sustainable innovation. However, responsible innovation also addresses detrimental implications of innovation, aims to respond to innovation uncertainties, and aims for a democratic governance of the innovation, which receives negligible attention in social- and sustainable innovation. The systematic literature review synthesis resulted in a refined framework for responsible innovation supported with empirically informed strategies to implement its underlying dimensions. The results from qualitative content analyses show that social entrepreneurs focus on creating direct socio-ethical value for their target beneficiaries, and coordinate collective stakeholder action to develop, implement and scale their systems-shaping solutions. Their bottom-up innovations are evaluated and scaled for impact, and institutional support is sought to create top-down systems change. The questionnaire results show that there are four different approaches to develop responsible systems-shaping solutions for societal problems.

To conclude, responsible innovation can learn from social- and sustainable innovation to prevent reinvention of the wheel. Responding to grand challenges with innovation requires coordinated collective action but a democratic governance of innovation cannot realistically be expected in a business context. Furthermore, social entrepreneurs develop *de facto* responsible innovation outcomes that respond to grand challenges and four different approaches to develop such innovations can be discerned. Moreover, to innovate for society requires a business logic that does not only focus on development of innovation, but equally on implementing and scaling for impact. Future research regarding responsible innovation in business contexts could investigate how to develop responsible innovations that create direct social value for target beneficiaries by responding to their societal problems or pressing social needs.

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Chapter 1

Introduction

1.1 Developing responsible innovations that respond to grand challenges

"Our generation only knew prosperity and experienced an increase in welfare, you are among
the first generations who will actually be faced with times of adversity"

These might not be the exact words of my math teacher as I was around 14 years old when she shared her view of the future with me and my fellow classmates. However, I still remember the essence of what she said very well, and her foresight could not have been further from today's reality. The PhD thesis that is now laying in front of you is driven by the urgency to find solutions for the many grand challenges that communities face all over the world. Take a swift look into public media and you are immediately updated on challenges all over the world, whether it is a migrant crisis in Europe, extreme climate events, or increasing socio-economic inequalities even during times of economic growth.

These challenges persist even though we experienced technological, economic and social progress (George et al. 2016). Some grand challenges actually exist due to technological, economic and social 'progress', just think of challenges ensuing from mass usage of automobiles or increasing global meat consumption. Nevertheless, science and technological development are still considered to be the panacea for addressing grand challenges (Godin, 2015). But responding to grand challenges requires collaboration among multiple and diverse stakeholders who engage in coordinated action (George et al. 2016). Governments are for example developing policy agendas to stimulate innovative solutions that respond to grand challenges[1]. Scientists and engineers increasingly focus their efforts on addressing grand challenges (George et al. 2016). Civil society actors are involved in initiatives such as grassroots innovation. Even though the business community was initially considered to be a source of grand challenges, they are nowadays seen as the most important community to develop and implement the necessary solutions (Adams et al. 2016) and they are increasingly willing to take up this gauntlet (Adams et al. 2016; George et al. 2016).

Although technology and innovation have a positive connotation nowadays, there are multiple reasons for questioning whether they are inherently good (Von Schomberg 2013; Godin 2015). First, innovations often have a profound impact on the public sphere, which is characterized by multiple

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[1] For example, the European Commission states that *"Europe's future is connected to its power to innovate. The Innovation Union, an action-packed initiative for an innovation-friendly Europe, is the solution"* (European Commission 2013, p.2). The government of the United States considers innovation as *"a powerful tool for addressing our most pressing challenges as a nation, such as enabling more Americans to lead longer, healthier lives, and accelerating the transition to a low-carbon economy"* (National Economic Council and Policy Office of Science and Technology 2015, p.2). Canada views that the way to go forward is by becoming a global centre for innovation by building *"an inclusive plan to foster a confident nation of innovators"* (Government of Canada 2016, p.2).

stakeholders with different, often competing, values and opinions. Consequently, there are most likely different views as to whether an innovation can be considered 'good', 'social' or 'responsible'. For instance, protagonists of animal welfare favour innovations leading to more free-range chickens in the poultry industry but farmers and local residents are likely to disagree as they risk to suffer from lung diseases. Second, innovation increasingly results from collective efforts and therefore has multiple 'authors'. This makes it hard, maybe even impossible, to hold people accountable for the innovation and/or its effects. Such collective irresponsibility could result in negative implications (Giddens 1999). It is for instance hard to pin down who is to blame for the global financial crisis that started in 2007. Third, innovations can have short-term advantages but also come with uncertainties, questions and dilemmas regarding the future impacts and consequences (Stilgoe et al. 2013; Giddens 1999). It is hard to predict the impact of the innovation as there is an inherent time delay, and it is hard to alter the innovation after it is implemented. These questionable conditions especially hold true for innovations that are disruptive, complex and hard to understand for non-experts (Sutcliffe 2011).

Responsible innovation is a new concept that builds on governance approaches and innovation assessments that aim to take social and ethical concerns into account already at the start of the innovation process, when changes can still be made. It is the result of a movement that considers innovation and technological development not only as a concern for experts; these development processes should open to stakeholders and the general public as well (Pandza & Ellwood 2013). One of the most widely used definitions of responsible innovation is proposed by Von Schomberg (2012), who defines responsible innovation as:

> *"a transparent, interactive process by which societal actors 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)" (p. 9).*

Innovating For Society and With Society

Responsible innovation requires that stakeholders and members of the public are involved in the earliest stages of the innovation process to deliberate about the multiple futures and uncertainties that the innovation could bring or seeks to bring. This upstream inclusion of stakeholders and the public, by deliberative forms of governance, can help to realise a collective responsibility to control and guide innovation into a direction that is ethically acceptable, societally desirable and sustainable (Von Schomberg 2012). Such responsible governance of innovation is expected to enhance the chance of innovation adoption and that innovations are better embedded in society. It also stimulates that the innovation delivers societal benefits (Ribeiro et al. 2016). Therefore, Stilgoe et al. (2013) define responsible innovation as *"taking care of the future through collective stewardship of science and innovation in the present" (p. 3)* or in broader terms as 'science [and innovation] with society' and 'science [and innovation] for society' (Owen et al. 2012).

However, multiple conceptualisations and definitions of responsible innovation exist (Bos et al. 2014; Burget et al. 2017). For one reason because the current concept of responsible innovation is developed by researchers and policy makers. Burget et al. (2017) conducted a thorough review of the definitions and conceptualisations proposed by policy makers and scientists, and conclude that:

> *"Responsible Innovation is essentially an attempt to govern research and innovation in order*
> *to include all the stakeholders and the public in the early stages of research and development.*
> *The inclusion of different actors and the public is, in turn, meant to increase the possibilities*
> *to anticipate and discern how research and innovation can or may benefit society as well as*
> *prevent any negative consequences from happening" (2017, p.15).*

In other words, responsible innovation is an aim to democratise innovation (Owen et al. 2013; Armstrong et al. 2012; Macnaghten et al. 2014) and realise deliberative forms of governance such as stakeholder and public engagement (Stilgoe et al. 2013). Many conceptualisations of responsible innovation share a focus on the conduct of responsible science and technological development (Lettice et al. 2013) and hardly differentiate between research, development and commercialisation (Pellé & Reber 2014). Even though the contents of responsible innovation are not very clear, the concept has a positive connotation (Bos et al. 2014). It reflects an ambitious and praiseworthy effort to develop, implement and diffuse responsible innovation in society. This should not only hold for science and technological development but also for marketable innovations that are developed and implemented by the business community.

However, Blok & Lemmens (2015) conclude that it is questionable whether the current notion of responsible innovation can actually be applied in business contexts, given our current political and socio-economic system. Problems for application emerge with regard to the drivers for responsible innovation, the responsible innovation process itself, and the subsequent responsible innovation outcomes. Considering grand challenges as drivers for responsible innovation is problematic as these are often wicked problems that are complex, ill-structured public problems that are hard to pin down or solve (Batie 2008). Being responsive to stakeholders is highly questionable when such grand societal challenges act as drivers for innovation (Blok & Lemmens 2015). There are also problems for application of responsible innovation in business contexts with regard to the process of innovation. For example, the presupposed transparency during innovation is conflicting with the notion that information asymmetries are at the root of innovation. Enhanced transparency reduces information asymmetries and therefore challenges the competitive advantage of the firm. Likewise, the presupposed mutual responsiveness and collective responsibility are conflicting with the notion that the investor alone is responsible for the risk-reward assessment and the subsequent investment decision (Blok & Lemmens 2015). Last, it is problematic that responsible innovation outcomes are self-evidently understood as technological innovations. This implies a narrow view of innovation (Blok & Lemmens 2015) especially because other forms of innovation, such as social innovation, can have a profound impact on society as well. Wikipedia is an example of a social innovation that has a profound impact on society (Santos 2012).

To conclude, implementing responsible innovation in a business context is still an ideal; it is an idea that exists in our imagination but at the same time it is unknown how it can be achieved in practice. Blok and Lemmens (2015) even question whether the current notions can be implemented in business contexts, given our current political and socio-economic system. However, the field of responsible innovation can be advanced when there is explored how the underlying purposes for innovation, the innovation process itself and the subsequent products and implications can come as close to the ideal of responsible innovation as possible. This would be an important achievement because the business community is vital for developing and implementing innovative solutions for grand challenges. Furthermore, companies play an increasingly important role in the public sphere, especially in times of government retrenchment. The fact that the public sphere is full of different, sometimes opposing, values and opinions is yet another reason why companies need to take socio-ethical considerations into account during innovation.

This PhD thesis responds to a call for more research to explore how responsible innovation can be understood, and implemented, in a business context. The research is not only based on theoretical inquiry since empirical research has been conducted as well. But how can empirical research take place if there are no cases available where entrepreneurs developed their innovations with the current understanding of responsible innovation in mind? This PhD thesis is based on two assumptions that form the basis why responsible innovation can already be studied in a business context. The first assumption is that there are already business cases where *de facto* responsible innovation practices can be found, and that lessons can be drawn from them. *De facto* responsible innovation practices are in this thesis understood as a purposes, processes and products of innovation that are in fact in line with conceptualisations of responsible innovation but they are not undertaken with the rules, guidelines or frameworks of responsible innovation in mind. This approach is not uncommon for responsible innovation research as other scientists aim to learn from *de facto* responsible innovation practices as well, such as risk assessment practices (e.g. Chatfield et al. 2017) or Corporate Social Responsibility (e.g. Pavie, Scholten, and Carthy 2014). The second assumption is that social entrepreneurship is an entrepreneurial form where such *de facto* responsible innovation practices can be found.

There is still no consensus about the definition of social entrepreneurship (Choi & Majumdar 2014), but a definition should logically draw upon entrepreneurial processes that require opportunity exploitation and resource (re)combination processes (Newth & Woods 2014). The definitional issues are elaborated upon later in this introduction, however the following working definition is adopted for now:

> *"Social entrepreneurship is exercised where some person or group: (1) aim(s) at creating social*
> *value, either exclusively or at least in some prominent way; (2) show(s) a capacity to recognize*
> *and take advantage of opportunities to create that value ("envision"); (3) employ(s)*
> *innovation, ranging from outright invention to adapting someone else's novelty, in creating*
> *and/or distributing social value; (4) is/are willing to accept an above-average degree of risk*
> *in creating and disseminating social value; and (5) is/are unusually resourceful in being*

relatively undaunted by scarce assets in pursuing their social venture" (Peredo & McLean
2006, p.64).

There are multiple reasons why social enterprises form a business community where *de facto* responsible innovation practices might take place. First of all, social entrepreneurs innovate *for* society. Social entrepreneurship is an alternative entrepreneurial form that prioritizes social value creation by responding to societal problems and neglected social needs (Mair & Martí 2006; Alvord et al. 2004; Santos 2012) and profit only serves to sustain their social value creation. For example, Muhammad Yunus is a social entrepreneur who challenged poverty in developing economies by developing microfinance structures, with his organisation Grameen Bank (Choi & Majumdar 2014). Second of all, scholars in social entrepreneurship presume that social entrepreneurs are change agents driven by a vision to create value for society (e.g. Dees (1998)). Vision can be understood as seeing alternative future realities for current social challenges, and having novel actionable ideas to reach those alternative realities (Waddock & Steckler 2016), which implies that social entrepreneurs engage in foresight. Furthermore, social entrepreneurs discriminate themselves from for-profit entrepreneurs in their ability to co-create solutions with stakeholders (Mueller et al. 2013). In other words, they are more likely to innovate *with* society. Social entrepreneurs are therefore likely to innovate *for* society and *with* society, which are the two aspects of responsible innovation (Owen et al. 2012). Hence, social entrepreneurship is most likely an alternative entrepreneurial form where *de facto* responsible innovation can be found (Ruggiu 2015).

In response to the previously mentioned challenges and opportunities for research, this PhD thesis aims:

> 1. To clarify the concept of responsible innovation by analysing where it is conceptually similar and dissimilar from social innovation and sustainable innovation.
> 2. To identify innovation practices and processes that can help to implement responsible innovation in a business context.
> 3. To identify and describe typologies of *de facto* responsible innovation processes in a social entrepreneurship context.
> 4. To find out how normative values are integrated into innovative solutions by social entrepreneurs, and describe the strategies to develop and implement such solutions.

The concepts of responsible innovation and social entrepreneurship are explained in the following section in which the theoretical framework is presented. The theoretical framework is followed by the outline of this thesis where each chapter is shortly introduced.

1.2 Theoretical Framework

This sub-section discusses the theories that are behind the concept of responsible innovation and the concept of social entrepreneurship in more detail. The section on responsible innovation discusses two main

approaches that can be found in the field, that is the procedural and normative approach. Subsequently, the concept of social entrepreneurship is discussed and explained how it is used in this PhD thesis.

1.2.1 Responsible Innovation

The genesis of responsible innovation did not start with a 'big bang'; it ensued from previous works related to socio-ethical issues in Bioethics, and later techniques such as Technology Assessment and Ethical, Legal and Social Aspects (ELSA) (Burget et al. 2017). However, these preceding approaches do not focus on the full spectrum of purposes, processes, products and implications of the innovation, instead they primarily investigate the research stage while often overlooking the important final stages of innovation, such as commercialisation. For example, Stilgoe et al. (2013) propose technology assessment as possible techniques for certain aspects of responsible innovation as it helps to raise important questions and interrogate multiple dimensions of science and innovation. However, in order for responsible innovation to get foothold, it is key that the concept also focuses on being responsive to the raised questions, matters, and future visions (Stilgoe et al. 2013). Moreover, the added value that responsible innovation aims to provide in comparison to ELSA is that it focuses on economic valorisation, industry collaboration and socio-economic benefits (Zwart et al. 2014).

The common thread that runs through the concept of responsible innovation comes down to the question: how can we develop innovations that have outcomes and implications that can be deemed responsible, and according to whom? There are two dominant and essentially different approaches when it comes to determining if an innovation can be deemed responsible, namely the normative (substantive) approach and the procedural approach[2] (Ruggiu 2015). The normative substantive approaches are based on the idea that innovation outcomes, and their effects on society, can be deemed responsible if they respond to prefixed normative anchor points. For instance, Von Schomberg (2012, 2013, 2014) refers to the principles, rights and freedoms that are constituted in the EU Treaty and its Charter of Fundamental Rights. The procedural approach to responsible innovation is based on the idea that the procedure to develop the innovation adheres to certain conditions or dimensions (Pellé 2016). If that is the case, the outcomes of the innovation process can be deemed responsible as well. The framework by Stilgoe, Owen, and Macnaghten (2013) for example prescribes that the procedure should identify the values and goals for innovation through a deliberative democratic process. Such a procedural approach can be understood as 'movable anchorage' because the goals and values are not predetermined and can vary over time or in different contexts (Ruggiu 2015). These two approaches had a profound impact on the development of the concept of responsible innovation, which is one of the reasons why they stand central in this PhD thesis. The normative and procedural approaches are explained in more detail hereafter.

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[2] As a matter of fact, Ruggiu (2015) uses the term 'socio-empirical' approach, which is actually similar to the procedural approach that for example Pellé (2016) and van Oudheusden (2014) talk about. For consistent use throughout the thesis there is chosen to use the term 'procedural' approach as it is more common in the discourse on responsible innovation.

Normative (substantive) approach

Von Schomberg (2011, 2012, 2013) refers to the European Treaty and the Charter of Fundamental Rights (CFR) to articulate the 'right impacts' of innovation because the rights and values that are stipulated in these documents are already democratically agreed upon. This implies that innovations should be *"founded on the values of respect for human dignity, freedom, democracy, equality, the rule of law and respect for human rights, including the rights of persons belonging to minorities"* (European Union 2007, p.11). Furthermore, it proclaims: "*a society in which pluralism, non-discrimination, tolerance, justice, solidarity and equality between women and men prevail"* (European Union 2007, p.11). Inferring from the Charter of Fundamental Rights, one could conclude that innovations should respect:

- Social justice
- Gender equality
- Solidarity
- Human rights
- Quality of life
- Protection of human health
- Protection of environment
- Sustainable development
- Competitive social market economy

Von Schomberg (2013) distillates these rights, principles and freedoms into three normative anchor points: (ethical) acceptability, societal desirability and sustainability. In other words, the normative substantive approach comes down to the idea that an innovation can only be deemed ethically acceptable if the innovation process, its products and subsequent implications respect the rights, principles and freedoms that are stipulated in the EU Treaty and its Charter of Fundamental Rights.

Procedural approach

Stilgoe, Owen, and Macnaghten (2013) developed a procedural framework for responsible governance of innovation to identify the values for innovation based on a democratic process. The innovation is responsible when the innovation process, its outcome and implications are responsive to these values. Such a process will be realised if it consists of the four dimensions: anticipation, reflexivity, inclusion and responsiveness. They do not proclaim a normative substantive view regarding the innovation outcome, instead their framework is based on movable anchoring; the outcomes of innovation process can be deemed responsible if it is based on values identified through anticipatory governance of innovation based on deliberative forms of stakeholder engagement. This is the textbook example of a framework for responsible innovation that adopts a procedural approach (Ruggiu 2015). It is one of the most dominant approaches in

responsible innovation literature (Ribeiro et al. 2016), and its ideas are diffused throughout the works on responsible innovation (Burget et al. 2017). Their procedural framework also stands central in this PhD thesis, not only because it has a profound impact in the field of responsible innovation but also because it aims to couple its underlying dimensions with the ability to act upon it (Stilgoe et al. 2013). There are four underlying dimensions that constitute the framework for responsible governance of innovation, which are further explained hereafter.

Anticipation requires that one engages in foresight activities that could help to steer innovations in a desirable direction while at the same time knowing that unforeseen consequences can never be ruled out. It is based on the idea that innovation in today's world is so complex that it is better to design towards a desirable future as opposed to predicting the future. Anticipation is expected to improve if stakeholders and members of the public are involved at the start of the innovation process when alterations can still be made. Furthermore, following from the democratisation of innovation, stakeholder inclusion is necessary to find out what can be understood with a 'desirable future'. *Reflexivity* requires that actors engaged in innovation become aware of their own norms, values and beliefs and how these could influence the trajectory of the innovation. Furthermore, they should be aware that their knowledge is subjective and that their perceived realities are not universally held. *Inclusion* and deliberation are at the core of responsible innovation, and are based on the assumption that deliberative forms of stakeholder and public engagement can help to steer the innovation in a desirable direction. It is important to account for the composition and representativeness of the stakeholder network, the timespan during which they are included, and the quality of the deliberation among the involved actors. Last, one should be *responsive* to new information and changing norms and values in the stakeholder network. This means that the innovations respond to societal problems, and that the innovation can be altered during development to realign it with stakeholder interests. This is one of the reasons why innovators are expected to be responsive to a movable anchor.

Present Biases in the Concept of Responsible Innovation

Both approaches, and the concept of responsible innovation in general, have gained prominence in policy making and research literature in Europe and the United States. The historical context in which this concept is developed also resulted in the fact that it is predominantly based on liberal democratic values (Wong 2016). This is clear in the normative anchor points by von Schomberg (2013) as they were obtained from the EU Treaty and its Charter of Fundamental Rights that are democratically agreed upon. And even though the procedural approach does not have (pre)determined normative goals for innovation, it is also justified by key democratic values; *"every individuals should have an equal standing to participate in (informed) public deliberation and that legitimacy of a decision and/ or policy is derived from the public participation and public deliberation"* (Wong 2016, p.158). While one could question whether the liberal democratic values are the best values for responsible

innovation, or the only values, this goes beyond the scope of this PhD[3]. However, it is vital to mention this bias, and to be aware that they are diffused throughout the concept. This also implies that one could challenge whether the concept of responsible innovation can be implemented beyond the 'Global North' (Macnaghten et al. 2014). Being sensitive to this bias and the challenges that come with it, the decision was made to focus the empirical research during this PhD on innovation practices and processes taking place in Europe, the United States and Canada.

Another bias that is clear in the concept of responsible innovation comes from its focus on new and emerging sciences and technologies, an artefact of the historical context in which the concept emerged. This resulted in a bias towards science, as opposed to innovation that has more of a market-orientation and focuses on phases of commercialisation (Lettice et al. 2013). For example, the dominant framework for responsible governance of innovation developed by Stilgoe et al., (2013) "*originate[s] from a set of questions that have emerged as important within public debates about new areas of science and technology. These are questions that public groups typically ask of scientists, or would like to see scientists ask of themselves*" (Stilgoe et al. 2013, p.1571). The aim of this PhD thesis is to look beyond responsible innovation initiated by scientists, and focus instead on market actors who are responsible for developing and implementing innovations in society. This focus on responsible innovation in business contexts was not apparent in the scholarly field when this PhD thesis started. However, the necessity to understand responsible innovation in business contexts was not only recognized by researchers like Blok & Lemmens (2015), Lettice et al. (2013) or by myself, but also by the European Union. That is why several European research projects were initiated to foster responsible innovation in industry; they were progressing simultaneously with the research activities of this PhD thesis. Examples of these EU projects are *Responsible-Industry* and one or more deliverables of the EU projects *Responsible innovation COMPASS, Satori, Progress* and *RRI-Tools*. Chapter 6 of this PhD thesis presents the conclusion and discussion and includes a section where the main findings and conclusion are discussed in the light of the insights that are shared in these EU projects.

1.2.2 Social Entrepreneurship

The development of the concept

All over the world one can find societal problems and pressing social needs that governmental, non-governmental (NGOs) and market organisations fail to effectively or efficiently respond to. However, social entrepreneurs are individuals who find innovative solutions that respond to exactly those challenges, and support their solutions with innovative business models. They develop innovative and efficient solutions for persistent problems that fail to be properly addressed (e.g. gender inequality, socio-economic disparities or discrimination). Consequently, they play an important role in societies experiencing resource scarcity and

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[3] I kindly refer you to Wong (2016) for an interesting and thorough discussion regarding the role of liberal democratic values in the concept of responsible innovation. He further proposes alternatives that might challenge this bias present in the scholarly field of responsible innovation.

where injustices are common. Developing countries probably come first to mind as contexts in which social entrepreneurs operate but they also play an increasingly important role in developed countries. The rise of social enterprises is also a response to the marketisation of the social service sector, combined with budget cuts, which urges more competitive and efficient solutions of organisations that have to act more entrepreneurial (Zahra et al. 2009).

Not only governments and practitioners express increasing interest in social entrepreneurship but also scientists start to research the phenomenon of social entrepreneurship (Sassmannshausen & Volkmann 2016); some even ironically raise the question whether the number of studies on social entrepreneurship exceeds the number of social entrepreneurs. In addition to an exponential increase in publications on social entrepreneurship, the concept also becomes more and more institutionalised in academia. There are more diverse topics addressed, articles become published in leading journals and are increasingly cited. All this scientometric evidence suggests that the academic field of social entrepreneurship has reached the phase of maturity (Sassmannshausen & Volkmann 2016).

Despite these increasing efforts in academia, there is still no consensus on what this phenomenon of social entrepreneurship actually entails (Choi & Majumdar 2014). This is remarkable as more than half of all publications focus on defining and conceptualising the phenomenon (Sassmannshausen & Volkmann 2016). There are a couple of reasons why social entrepreneurship is still considered to be a contested concept, and why a single definition is therefore not possible (Choi & Majumdar 2014). Social entrepreneurship is a complex concept that consists of multiple sub-concepts, which leads to internal complexity. These sub-concepts are: social value creation, the entrepreneur, the organisation, market orientation and social innovation. The problem is that different sub-concepts come to the fore in different conceptualisations of the phenomenon. This is why a standardised and universally accepted definition cannot be not found. Furthermore, scientists attack definitions and aim to defend their own, which implies that there are aggressive and defensive uses of the conceptualisations and definitions of social entrepreneurship.

Conceptualisation of social entrepreneurship

Choi & Majumdar (2014) respond to this contestation by proposing that social entrepreneurship is a multidimensional concept. The concept consists of the necessary condition *social value creation* and the sufficient conditions *social entrepreneur*, *social enterprise organisation*, *market orientation*, and *social innovation*. These five dimensions are discussed respectively and they are graphically represented below in figure 1, which comes from Choi & Majumdar (2014, p. 373).
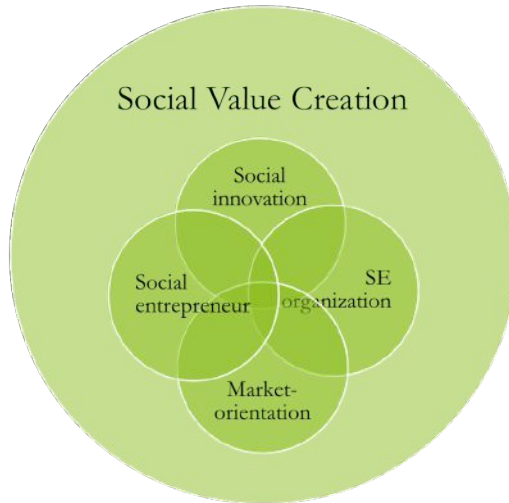
Figure 1. *Social entrepreneurship as a cluster concept (obtained from Choi & Majumdar (2014, p. 373)).*

Social value creation.   Social value creation is in itself a complex concept that is ambiguous and can be contested. Precisely this 'social' is ill-defined in social entrepreneurship literature, and defining it is problematic because establishing the social ends is a political process that is full of values (Cho 2006). The question whether an innovation is social lays inherently in the eyes of the beholder (Santos 2012). Santos (2012) developed a positive theory of social entrepreneurship as opposed to a normative one. He argues that social entrepreneurs focus on value creation. Value creation is defined as *"the aggregate utility of society's members increases after accounting for the opportunity cost of all the resources used in that activity"* (Santos 2012, p.337). The value capturing (i.e. profit) only serves to sustain the value creation. Zahra et al. (2009) stresses the importance of not only accounting for the created social value but also for the (social) costs involved (Zahra et al. 2009), for example costs incurred due to disruption of the social system.

Social entrepreneur.   Stephan & Drencheva (2017) argue that research regarding the personality of the social entrepreneur is dispersed and considered as a niche. Nevertheless, the personality a person is proven to be relevant for pursuing an entrepreneurial career in general and social entrepreneurship in particular. However, conceptualisations of the personality of social entrepreneurs should go beyond the current portrayal to consider them as heroic individuals. Stephan and Drencheva (2017) therefore conducted a systematic literature review of empirical studies that investigated the motivations, traits, identities and skills that are particular for being a social entrepreneur.

  Their review revealed that social entrepreneurs are heterogenous with regard to their personalities. They are driven by a range of motivations and values, including prosocial values and moral motives. However, their openness to change and need for autonomy also drives them to pursue an entrepreneurial career, just like their for-profit peers. Profit-oriented- and social entrepreneurs share personality traits like

self-efficacy, risk-taking, persistence, optimism and proactivity. However, empathy and moral obligations seem to be traits that are particularly relevant for social entrepreneurs, although this finding requires more robust evidence. Profit-oriented and social entrepreneurs both benefit from transformational leadership and management skills as it leads to innovation-supportive organisation cultures. However, social entrepreneurs aim to achieve this by stimulating socially responsible cultures, whereas for-profit entrepreneurs stimulate competitive cultures for this reason. Last, social entrepreneurs have a disposition to start a social enterprise, for example due to personally experienced needs or challenges, relevant work experience in the field or supportive circumstances (e.g. family traditions or financial conditions).

Social enterprise organisation.   Social entrepreneurship takes place within an organisational framework, which sets it apart from other forces of social change such as social movements (Mair & Martí 2006). Social enterprises adopt aspects from for-profit enterprises that typically create value for their owners and stakeholders, and at the same time also adopt aspects from charities who serve the public as opposed to private interests. They are held accountable for both social and financial returns, and therefore have to balance their social mission and revenue generation, which can require new legal organisational forms (Ebrahim et al. 2014).

Currently, social enterprises take different legal forms such as foundations, cooperatives, limited liability companies (LLC) or corporations. Some have multiple legal forms, for example one for commercial activities to serve customers and one for social activities to serve beneficiaries. Others have one legal form to simultaneously pursue commercial and social activities, for example by selling eyeglasses or microfinance to the poor. Each of these forms face different governance challenges and conditions that could lead to mission drift (Ebrahim et al. 2014). Nowadays there are new organisational forms introduced that do more justice to the hybridity of social enterprises. For example, there is the low-profit limited liability company (L3Cs), benefit corporation (B-Corps) and community interest company (CICs) (Ebrahim et al. 2014). However, these forms are country dependent, whereas the Netherlands does not have a legal form for social enterprises. The foundation *Social Enterprise NL* therefore suggests a code for social entrepreneurship, and provides a tool to decide which legal form is most suitable for a particular social enterprise.

Market orientation.   Social entrepreneurs develop sustainable solutions for societal problems or pressing social needs that are neglected by other market actors and the government. These solutions are not only sustainable because the entrepreneur aims to address the roots of the problem but also because they engage in value capturing. Value capturing comes down to the profit that is left after delivering valuable goods or services that the customer is willing to pay for (Santos 2012). Social entrepreneurs have to balance the importance of value creation and value capturing; they aim to maximise value creation while achieving satisficing levels of value capturing. An additional notion of market-orientation in social entrepreneurship comes from its focus on heightened efficiency and effectiveness through market activities, which ultimately results in sustainability and self-sufficiency of the firm. The market orientation can involve commercial

activities as in generating income from the social entrepreneurship activities or it can refer to effective and efficient distribution of social services and products (Choi & Majumdar 2014). In both cases they see the market as a mechanism for creating and scaling their social impact (Mair & Martí 2006).

(Social) innovation. Innovation is a key dimension of social entrepreneurship because the entrepreneurs need to engage in innovation to develop solutions for the societal problems that they want to tackle (Chell et al. 2010). Where others accept or tolerate inconvenient situations, social entrepreneurs see it as an opportunity to create something new. They have the inspiration to alter the situation and the creativity to develop a solution. Subsequently, they act and have the courage to pursue the solution and have the strength to bring the solution to market (Martin & Osberg 2007).

In this PhD thesis, the innovation process is understood as the phase of finding, developing and implementing a solution after recognising neglected social needs or unaddressed societal problems that needs to be resolved. The final solution is then considered as the innovation outcome. These are often what Draper (2013) calls 'systems-shaping solutions', which are solutions that consist of several interrelated innovations. The underlying innovations can manifest themselves as products, production processes, technologies, services, interventions, business models or a combination of them (Rasanathan et al. 2012) thereby differing in extent of formalisation (Choi & Majumdar 2015). Ultimately, the solution and its underlying interrelated innovations have certain implications for society. At best it solves the neglected social needs or unaddressed societal problem without having any negative consequences. Systems-shaping solutions are increasingly needed since the challenges become more complex (Adams et al. 2016).

1.3. Thesis Outline

Let me briefly outline the set-up of this PhD thesis, which consists of two parts. The first part focuses on a *theoretical* exploration to advance the conceptual clarity of responsible innovation in a business context (Chapter 2), and aims to identify the innovation practices and processes that can help to implement it in a business context (Chapter 3). The insights obtained from this theoretical exploration are subsequently used to develop a self-assessment questionnaire. This questionnaire serves to evaluate to what extent social entrepreneurs implement the dimensions of responsible innovation during the development of their innovations. This brings us to the second part of this PhD thesis, which focuses on an *empirical* exploration of responsible innovation in the specific business community of social entrepreneurs. This is confined to social entrepreneurs operating in the United States, Europe and Canada because applying the concept of responsible innovation can be problematic beyond the Global North (Macnaghten et al. 2014; Wong 2016). The first empirical study (Chapter 4) is a retrospective study that focuses on the *process* dimension of innovation, which relies predominantly on the questionnaire data. It aims to assess to what extent social entrepreneurs implemented the process dimensions of responsible innovation during the development of their innovations. The second empirical study (Chapter 5) focuses on the *product* dimension of innovation. It aims to assess whether the innovation outcomes and their implications can be deemed responsible, and

describes the strategies to develop, implement and scale responsible innovations. This Chapter relies predominantly on the qualitative data from profile descriptions of best practice social entrepreneurs. The outline of this PhD thesis is graphically represented in Figure 2. The next section describes the design of this PhD thesis in more detail.

Part 1: theoretical exploration

Chapter 2

There have been several scientific efforts to advance the conceptual clarity of responsible innovation by analysing it in comparison to related concepts. For example, Ribeiro et al. (2016) unpacked the different understandings of responsible innovation related to science policy, whereas Zwart, Landeweerd, & van Rooij (2014) critically examined the novelty of responsible innovation compared to previous works around Ethical, Legal and Societal Aspects (ELSA) in science and emerging technologies.

The aim of Chapter 2 is twofold. First it aims to find out how innovation in a business context can take place *with* society and be beneficial *for* society (Owen et al. 2012). Furthermore, it aims to inspire future research to shift the discussion from responsible science towards responsible innovation. Instead of reinventing the wheel and starting from scratch, it could be beneficial to learn from insights obtained from social innovation research, since it has been more practice-oriented and predominantly studied in the context of entrepreneurship (Choi & Majumdar 2015). Furthermore, social innovations are innovations that takes place *with* society and that aim to be beneficial *for* society as well (Ayob et al. 2016). Not surprisingly, in a recent call for papers by the Journal of Product Innovation Management (21 July 2017) the question is raised whether or not social innovation is different from responsible innovation, and if so how. Likewise, corporate sustainable innovation has already received considerable attention from researchers, managers, and policy makers. Moreover, responsible innovation can be seen as a novel approach to innovate for sustainability (Adams et al. 2016). Hence, Chapter 2 aims to answer the following research question to advance the conceptual clarity of responsible innovation in business contexts:

- What are the conceptual similarities and dissimilarities between the concept of responsible innovation and the concepts of social- and sustainable innovation?

Chapter 3

The concept of RI is relatively new and upcoming, and it gained traction simultaneously with the start of the research for this PhD thesis in 2013. Around the same time, the most important and influential publications were published (e.g. von Schomberg, (2012, 2013), Owen et al., (2013), Stilgoe et al., (2013) and the European Commission (2013)). However, the conceptualisations of responsible innovation were developed by researchers and policy makers (Burget et al. 2017) who focused predominantly on the conduct of responsible science and technological development (Lettice et al. 2013) without differentiating between research, development and commercialisation (Pellé & Reber 2014).

The aim of the study in Chapter 3 is therefore:

- To identify innovation practices and processes that can help to implement responsible innovation in a business context.

This purpose is met by systematically identifying, analysing and synthesising findings in 72 empirical studies that reported social-, sustainable- and responsible innovation practices and processes in business contexts. This study is a first effort to support further operationalisation of responsible innovation in a business context, and aims to refine the procedural framework of responsible innovation by Stilgoe et al. (2013). The refined framework in Chapter 3 forms the basis for the self-assessment questionnaire. The data that is obtained from these self-assessments are used in two empirical studies that are presented in Chapter 4 and 5.

Part 2: empirical exploration

Chapter 4

Social entrepreneurs play a vital role in our societies as they develop innovative solutions for complex societal challenges. However, even though their intentions are to create social value, it does not mean that the implications of their practices and processes are inherently good (Nicholls 2006). It is important to maintain a critical view regarding innovation in social enterprises, and not to view them as heroic individuals. For example, because innovation is still an understudied sub-concept of social entrepreneurship (Sassmannshausen & Volkmann 2016; Doherty et al. 2014). And social entrepreneurs have to take socio-ethical considerations into account as well since their innovations can also have a profound impact on society (Ebrahim et al. 2014; Zahra et al. 2009). Their innovations face the inherent uncertainty that they might have adverse effects too, or that they cause new challenges (Zahra et al. 2009). Chapter 4 responds to the previously mentioned knowledge gaps by answering the following research question:

- What are the different approaches to manage the development of innovations in the field of social entrepreneurship?

The concept of responsible innovation is used as a research lens to better understand how social entrepreneurs govern the development of their innovations for society. The methodological approach in this study is a mixed methodology, as it involves a combination of quantitative data obtained from the self-assessment questionnaire and qualitative data in the form of profile descriptions. The quantitative analysis is based on a self-assessment of responsible governance of innovation provided by 42 Ashoka fellows. These are social entrepreneurs who went through a thorough selection process and are therefore considered to be exemplary change agents in society. The qualitative approach involves analyses of the profile descriptions of each of these 42 social entrepreneurs obtained from Ashoka's online database. The main aim of the qualitative analysis is to contextualise the results obtained from the quantitative self-assessment.

Chapter 5

The study presented in Chapter 5 takes a different angle with regard to responsible innovation in social entrepreneurship. It pays special attention to the normative substantive values for responsible innovation and aims to explore how they are reflected in the innovation outcomes of best practice social entrepreneurs. In other words, it assesses to what extent the innovation outcomes can be considered as *de facto* responsible innovations. This is determined based on the normative anchor points that von Schomberg proposes in his works (Von Schomberg 2011; Von Schomberg 2012; Von Schomberg 2013).

Another reason why responsible innovation can help to advance social entrepreneurship ensues from the fact that social entrepreneurs almost inevitably operate in the public sphere (Santos 2012). They are thereby confronted with different values and opinions regarding what is social (Cho 2006). However, von Schomberg (2013) argues that there are predetermined public values that are already democratically agreed upon, and translated into more specific rights, principles and freedoms. These are stipulated in the EU Treaty and its Charter of Fundamental Rights. More importantly, von Schomberg argues that normative anchor points can be used as a compass for the right impacts of responsible innovation. This refers to the 'product' dimension of innovations (Von Schomberg 2013). Therefore, the last empirical research in this PhD thesis aims to:

- Explore how social entrepreneurs integrate the rights, principles and freedoms that are considered the right impacts of innovation.
- And to describe the strategies that social entrepreneurs follow to develop, implement and scale their innovations.

This chapter therefore focuses more on their role as change agents who want to improve the world for the better as there is elaborated upon implementation and scaling of their innovations for impact. The strategies that are described in Chapter 5 therefore relate to different stages of innovation than Chapter 4 that focuses on the process from the initial idea until the final innovation for implementation. The empirical research in the second part of this PhD thesis is expected to advance the field of responsible innovation and social entrepreneurship, and is therefore expected to act as a double-edged sword.

Chapter 6

This chapter first presents the main answers to the research questions and the main conclusions that can be drawn from the these. This is followed by the theoretical and methodological contributions of this PhD thesis, and one section that specifically discusses the findings of this thesis in the light of the latest EU projects on responsible innovation in industry. This is followed by the limitations of this research and recommendations for future research. This PhD thesis finishes with recommendations for policy makers and social entrepreneurs.

Chapter 1. Introduction

Theoretical part

Chapter 2

Conceptual analysis to clarify the concept responsible innovation by looking at social innovation and sustainable innovation; two distinct but related innovation concepts that are already implemented in business contexts.

Chapter 3

Systematic literature review of empirical articles of responsible-, social- and sustainable innovation in business contexts. The goal is to develop an empirically-informed refined framework for responsible innovation that can also hold for business contexts. This framework can be used for further operationalisation for empirical research of responsible innovation in a business context.

Empirical part

Develop a self-assessment questionnaire to assess *de facto* responsible innovation processes during the development of the innovations by social entrepreneurs.

Chapter 4

Empirical investigation of *de facto* responsible innovation processes by social entrepreneurs, and to identify whether different typologies of social entrepreneurs can be identified.

Chapter 5

Empirical investigation of *de facto* responsible innovation outcomes that are developed, implemented and scaled by social entrepreneurs.

Chapter 6. Conclusion and Discussion

Conclusions will be drawn based on the findings of the four studies. Additionally the theoretical and methodological contributions are discussed in general and EU projects in particular. This is followed by the limitations of this study and recommendations for future research. This chapter will finish with recommendations for policy makers and social entrepreneurs.
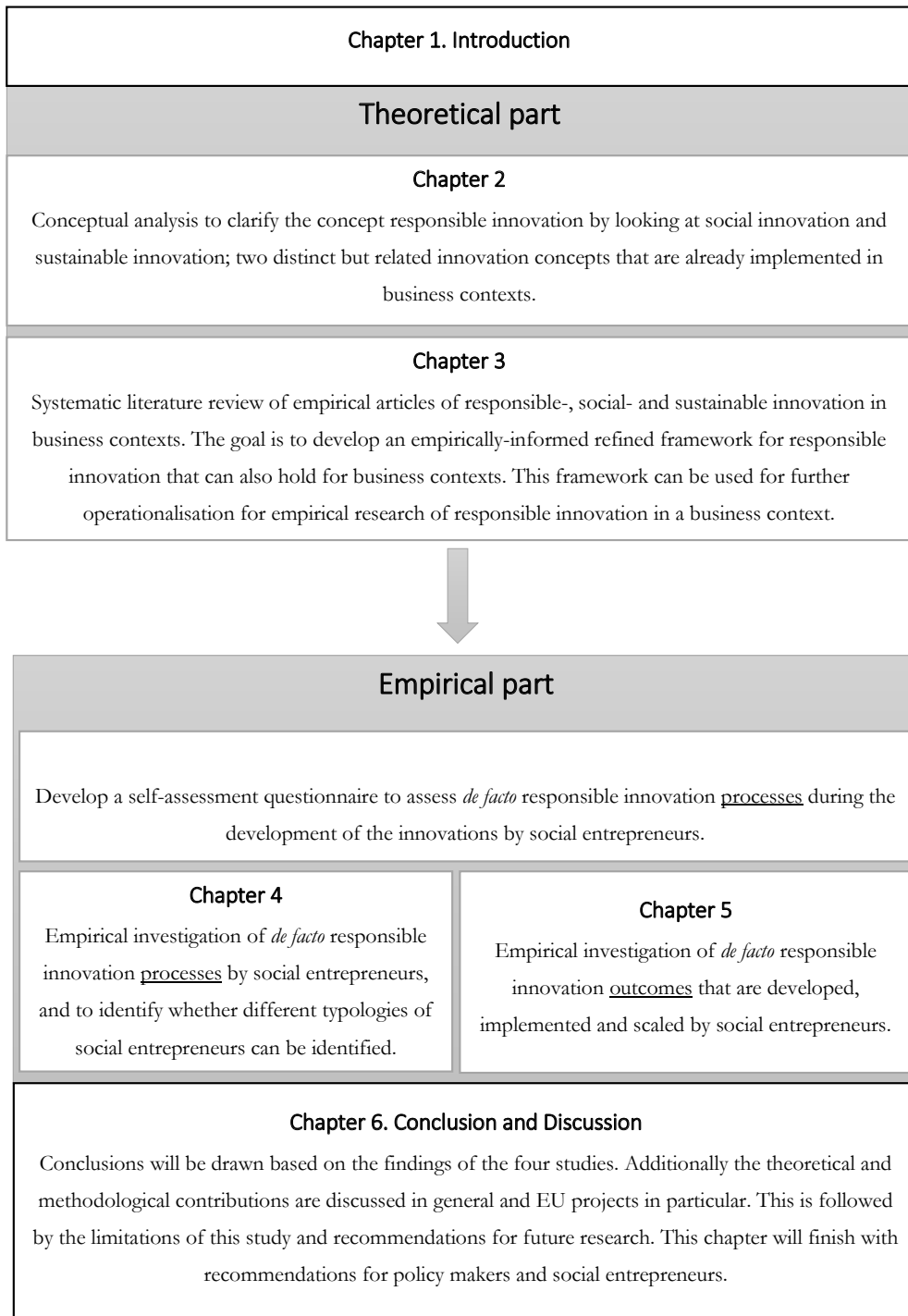
Figure 2. *Graphical representation of the outline of the PhD thesis*

The Theoretical Part

Chapter 2

Learning from conceptual similarities and dissimilarities between Responsible-, Social- and Sustainable Innovation[4]

2.1. Introduction

The European Commission wants to accelerate innovation and technological development to address the 'Grand Challenges' of our time, such as global warming, ageing populations and resource scarcities. They state that *"Europe's future is connected to its power to innovate. The Innovation Union, an action-packed initiative for an innovation-friendly Europe, is the solution"* (European Commission 2013, p.2).

Although technology and innovation have a positive connotation, one can question whether they are inherently good (Von Schomberg 2013). Innovations can have short-term advantages but also come with uncertainties, questions and dilemmas regarding the future impacts and consequences (Stilgoe et al. 2013). The combustion engine for instance is nowadays essential for transportation but also one of the main causes of CO_2 emissions. Likewise, the effective insecticide DDT turned out to be very harmful to the environment as well.

Responsible innovation is an emerging concept that aims to prevent or deal with problems that arise with innovation. This is done by taking social and ethical aspects into account and by balancing economic, socio-cultural and environmental aspects (Blok and Lemmens 2015). Burget et al. (2016) state that *"Responsible Innovation is essentially an attempt to govern research and innovation in order to include all the stakeholders and the public in the early stages of research and development. The inclusion of different actors and the public is, in turn, meant to increase the possibilities to anticipate and discern how research and innovation can or may benefit society as well as prevent any negative consequences from happening"* (p. 15).

Responsible innovation borrows processes and tools from work in Bioethics, Technology Assessment and Ethical, Legal and Social Aspects (ELSA) (Burget et al. 2017). These approaches do not study the whole spectrum of purposes, processes, products and implications of the innovation, but they primarily investigate the research stage while often overlooking the important final stages of innovation, such as commercialisation. The added value of responsible innovation in comparison to ELSA is that it focuses on economic valorisation, industry collaboration and socio-economic benefits (Zwart et al. 2014). Van den Hove et al. (2012) argue that responsible innovation goes beyond creating just economic growth,

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as it aims at benefitting people by meeting their needs and by providing economic, environmental and social sustainability.

The concept of responsible innovation in a business context faces three major challenges. First, responsible innovation lacks definition and conceptual clarity. It is a 'big word' that gives some direction but its contents are flexible and open (Bos et al. 2014). Correspondingly, the boundaries between the different underlying dimensions of the responsible innovation framework are blurred (Owen et al. 2013). Second, empirical research in the field of responsible innovation is lacking (Blok et al. 2015). This is because this field of research is relatively new, and was introduced in a top-down manner by policy makers (Burget et al. 2017), and is defined and understood in different ways (Bos et al. 2014; Burget et al. 2017). Third, responsible innovation has a narrow view on innovation as it focuses on science (Lettice et al. 2013) and technological development (Ribeiro et al. 2016) and fails to include commercialisation (Pellé and Reber 2014). This is remarkable because commercialisation is an essential stage of an innovation process and also, most innovations take place in the private sector (Baregheh et al. 2009). Consequently, it is still unknown what the concept of responsible innovation entails in business contexts (Blok & Lemmens 2015).

We suggest that previous work on social innovation and sustainable innovation can be used to advance the concept of responsible innovation in a business context. One reason is that social- and sustainable innovation are already embedded in business contexts. Social innovation research has been more practice-oriented and predominantly studied in the context of entrepreneurship (Choi & Majumdar 2015), while corporate sustainable innovation has already received considerable attention from researchers, managers, and policy makers (Adams et al. 2016). Second, we argue that social- and sustainable innovation are conceptually overlapping with responsible innovation, since each of these three innovation approaches is considered to involve innovations *for* society and *with* society.

In this chapter we analyse where the current concept of responsible innovation shares conceptual similarities and dissimilarities with social innovation and sustainable innovation with regard to: the *inputs* for innovation, the innovation *processes*, and the subsequent *outputs* and implications of these innovations for society. At the conclusion of this study we synthesize the results and lay the basis for the concept of responsible innovation in business contexts. Our aim is to inspire future research on responsible innovation in business contexts by shifting the discussion from responsible science towards responsible innovation. Consequently, three research questions need to be answered:

1. In what way is responsible innovation conceptually overlapping with social- and sustainable innovation in regard to purpose, process, products and implications of the innovation?
2. In what way is responsible innovation conceptually distinctive from social- and sustainable innovation in regard to purpose, process, products and implications of the innovation?
3. What do these conceptual similarities and dissimilarities mean for our understanding of responsible innovation in business contexts?

Since social- and sustainable innovation are defined in different ways by different streams of researchers, we argue that our proposed concept of responsible innovation should not be based on just a limited set of definitions. We expect that literature reviews of responsible-, social- and sustainable innovation research

provide better insights of the different perspectives on each of these concepts. Therefore, this chapter contains a conceptual analysis of literature reviews and does not involve a meta-analysis or empirical research.

The remainder of this chapter is structured as follows. In the Literature Review, the concepts of responsible-, social- and sustainable innovation are explained with information from review articles. First, the concept of responsible innovation is explained, which is followed by a section where the concept of social innovation is explained. Subsequently, the conceptual similarities and dissimilarities between responsible- and social innovation are presented. The same structure is followed for sustainable innovation. In the final section we will integrate these findings and develop our understanding of responsible innovation in business contexts.

2.2. Responsible Innovation

Input of Responsible Innovation

Responsible innovation is a new and upcoming concept triggered by the call for innovations that respond to the grand challenges of our time (Von Schomberg 2014) such as climate change, food security and poverty. The innovation that is necessary for finding solutions comes with uncertainties regarding their development and their future implications (Stilgoe et al. 2013). These complex challenges or 'wicked problems' can be seen as inputs for responsible innovation (Blok & Lemmens 2015).

The future implications of innovations cannot always be predicted during the development of the innovation. Responsible innovation acknowledges this inherent uncertainty and it aims to achieve governance of the innovation to accommodate the uncertainty of future implications (Stilgoe et al. 2013). Other reasons to initiate responsible innovation can be due to public policy demands, to increase the odds of public acceptance, to better foresee possible implications, to deliver societal benefits and to develop better novel practices (Ribeiro et al. 2016).

Throughput of Responsible Innovation

Owen (2012) and Stilgoe (2013) developed a more democratic governance framework for innovation that is based on contemplating the purpose(s) of the innovation instead of focusing on avoiding detrimental implications (Ribeiro et al. 2016). More specifically, stakeholders and members of the public are involved early in the innovation process to deliberate about the innovation at stake, which helps innovators to think carefully about the purpose of the innovation. Furthermore, the deliberation should involve discussions on how the development of the innovation can be responsive to the inherent uncertainties that come with innovation. Hence, their anticipatory governance of innovation is based on a collective duty of care that requires alternative constructions of (co-)responsibility (ibid.).

Von Schomberg (2012) has a similar focus on a democratic governance of innovation and defines the process responsible innovation (i.e. the throughput) as:

> *"… a transparent, interactive process by which societal actors 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)" (Von Schomberg*
> *2012, p. 9).*

It is widely acknowledged that there are several conceptualisations and definitions of responsible (research and) innovation (e.g. Burget et al. 2016; Gianni and Goujon 2014; Wickson and Carew 2014). Accordingly, there are multiple approaches developed for responsible innovation, for example approaches that focus on evaluation of the benefits, impacts, unanticipated risks and ethical implications of the innovation (e.g. Technology Assessment). However, the framework developed by Owen et al. (2012) and Stilgoe et al. (2013) is one of the most dominant approaches in responsible innovation (Ribeiro et al. 2016). Furthermore, the systematic literature review by Burget et al. (2016) identified four dimensions that are recurring throughout the literature on responsible innovation. These are the same four dimensions that comprise the framework for responsible innovation developed by Owen et al. (2012) and Stilgoe et al. (2013): anticipation, reflexivity, inclusion, and responsiveness. These four dimensions are further discussed as they are considered to be key for the throughput of responsible innovation.

Anticipation involves system thinking about any known, likely, plausible and possible implications of the innovation that is to be developed (Stilgoe et al. 2013). It plays an essential role in the beginning of the innovation, and requires that the actors involved in the innovation understand the dynamics that help to shape the innovation (Burget et al. 2017). Furthermore, the complexities and uncertainties that come with innovation are acknowledged and explicitly taken into account (Stilgoe et al. 2013). Therefore, the 'imaginations' of future implications do not serve to predict futures, but to envision desirable futures and organise resources to meet those desirable futures. The challenge here is to make certain imaginations more concrete while at the same time being receptive for other views. This needs to be done at a time when it can be constructive, but not too late to adjust the innovation (ibid.). This requires early inclusion of stakeholders and the wider public who engage in *"a dedicated attempt to anticipate potential problems and assess available alternatives"* (Wickson & Carew 2014, p.2).

Reflexivity is about critically scrutinising one's own activities, commitments and assumptions, and being aware of the limits of knowledge and the fact that one's reality might not be universally held (Stilgoe et al. 2013). Innovators need to reflect on their value systems and theories and how these affect the development of the innovation. Furthermore, innovators need to blur the lines between their role responsibility and their wider moral responsibilities (ibid.). Wickson and Carew (2014) found that reflecting on underlying values, assumptions and beliefs, was a recurring theme in the different conceptualisations of responsible innovation, which can be enhanced by early inclusion of stakeholders and the public.

Inclusion is the dimension that comes back in all articles on responsible innovation as it is vital for proper implementation of the other three dimensions (Burget et al. 2017). Inclusion is the actual involvement of stakeholders and the wider public via dialogue or other ways to enhance the democratic governance of innovation. Aspects of Inclusion are intensity, openness, and quality of the discussion. Actors have to initiate discussions and to question the social, political and ethical implications of the innovation (Stilgoe et al. 2013). One could say that responsible innovation involves an *"active engagement of stakeholders for the purpose of substantively better decision-making and mutual learning"* (Wickson & Carew 2014, p.2)

Responsiveness is about having the capacity to change shape or direction in response to values of stakeholders, values of the wider public and changing circumstances. Furthermore, it is about actually adjusting courses of action while recognising the insufficiency of knowledge and control, and responding to new knowledge, perspectives, views and norms that emerge when innovating. This in turn requires a collective institutionalised response and co-responsibility for responsible development of the innovation (Owen et al., 2013). Or as Wickson and Carew (2014, p. 2) put it: *"a willingness among all participants to act and adapt according to these ideas"*.

Output of Responsible Innovation

When it comes to the output of responsible innovation, we have to consider the actual products of the innovation process and their implications for society. It is clear from the reviews (Burget et al. 2017; Ribeiro et al. 2016) that the outputs of responsible innovation processes are predominantly understood as science and technological development. However, Blok and Lemmens (2015) suggest that we should widen our conception of innovation and include non-technological innovation as well, such as social innovations.

The overall goal embedded in the different conceptualisations of responsible innovation is to take social and ethical aspects into consideration with regard to the development of the innovations (Ribeiro et al. 2016) and its marketable products (Von Schomberg 2012). When it comes to the impacts of innovations, there are two approaches to determine whether the impact of an innovation can be considered responsible. According to the procedural approach (e.g. Stilgoe et al. 2013), the stakeholders develop and agree upon norms and moral judgments by engaging in deliberation (Pellé and Reber 2014, p. 41). The rightness/goodness of norms depends on the quality of stakeholder inclusion and deliberation. These norms can be translated into conditions that the innovation outcomes and their impacts should meet. The substantive approach builds primarily on prior given norms and moral judgments to determine if the outcomes and impacts of innovation processes can be deemed responsible (ibid.). For example, Von Schomberg (2013) builds on the normative anchor points presented in the European Treaty (e.g. sustainable development, social justice and protection, equality, and sustainable economic growth). Translated into broad innovation requirements, it means that responsible innovations should be societally desirable, sustainable, and ethically acceptable (Von Schomberg 2013).

2.3. Social innovation

Social innovation is anything but a new phenomenon (Mumford 2002) and most of the research and definitions of social innovation are introduced by people who solved practical problems, instead of scholars who developed social innovation theory (Caulier-Grice et al. 2012). Consequently, publications on social innovation have been mostly practice-oriented (Choi and Majumdar 2014).

However, the term social innovation is nowadays commonly, but not consistently, used by scientists (Moulaert et al. 2005) as it is conceptualised and defined in different ways (Cajaiba-Santana 2014; Choi & Majumdar 2015). For example, the term social innovation is not only used as a synonym for (unintended) social change, but also for intangible innovations that are designed with an intention to achieve specific ends (Choi & Majumdar 2015). However, social innovation often takes part in the entrepreneurial context where it encompasses innovations that are *"explicitly aiming at the creation of social value and thus at positive social change. Hence, in this case, the 'social' denotes that the purpose of social innovation is to meet pressing social needs and to improve human and environmental well-being"* (Choi & Majumdar 2015, p.27). For example, innovations that result in better access to healthcare, education or equal opportunities for income generation (ibid.)

The fact that social innovation is conceptualised and defined in different ways by different schools of researchers is also observed by van der Have and Rubalcaba (2016) who conducted a systematic network- and bibliometric analyses of social innovation[5]. This multiplicity of research schools that hold different perspectives on social innovation makes it hard, if not impossible, to achieve a consensus on the meaning of the concept (Choi and Majumdar 2014). Therefore, we argue that it is more appropriate to do a conceptual analysis based on literature reviews on social innovation (e.g. Choi and Majumdar 2014; Sharra and Nyssens 2010; van der Have and Rubalcaba 2016) instead of doing a conceptual analysis based on a single definition of social innovation.

Input of social innovation

The purpose of social innovation is to enhance social- and/or environmental well-being by addressing social needs or by solving social problems (Choi & Majumdar 2015) that are not being met by government or market actors (Sharra & Nyssens 2010). Also Van der Have and Rubalcaba (2016) observed that social innovations aim to meet common goals, solve social (-technical) challenges, or address matters of local development. More specifically, they identified an academic community that views social innovations as solutions to social (-technical) challenges, primarily directed to sustainability of climate, environment and health provisions (ibid.).

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[5] For more information regarding the history of social innovation as a scientific concept and how different scientific communities influenced the scientific discourse on the concept, please see Choi and Majumdar (2014) and Van Der Have and Rubalcaba (2016). Since this goes beyond the aim of this chapter, it is not thoroughly discussed here.

Throughput of social innovation

Regarding the process of social innovation, there are two distinct streams of researchers that have a process-oriented understanding of social innovation (Van Der Have and Rubalcaba 2016). Researchers who investigate social innovation from a community psychology perspective understand social innovation as a process for systemically introducing change in social systems to solve (complex) social problems. Researchers investigating social innovation from a creativity research perspective aim to understand how new ideas of social relationships and social organisation are developed to generate and implement solutions to meet a common goal (ibid.). These two schools were also identified by Choi and Majumdar (2014).

There is also a stream of researchers who focus on the role of social innovation in local development (van der Have & Rubalcaba 2016; Choi & Majumdar 2015). They understand social innovation as: *"satisfying human needs through (an empowering) change in the relations between local civil communities and their governing bodies"* (van der Have & Rubalcaba 2016, p.1928). This cluster pays special attention to the role of institutions and inclusive forms of collaboration in social innovation processes (ibid.). That collaboration is important in social innovation becomes clear in the review Sharra and Nyssens (2010) who found that the major characteristic of the social innovation process is the involvement of *"a complex network of formal and/ or informal partnerships between various stakeholders"* (Sharra and Nyssens 2010, p. 7). Likewise, Dawson and Daniel (2010, p. 16) describe social innovation as a *"process of collective idea generation, selection and implementation by people who participate collaboratively to meet social challenges"*. Social innovation is seen a collective endeavour where innovators and stakeholders (primarily target beneficiaries) reflect upon the purpose and end of the social innovation (Choi & Majumdar 2015). Especially practice-led research regarding social innovation stresses a dual objective, namely developing innovative solutions for societal problems while at the same time making sure that societal stakeholders have the capacity to act (ibid.).

Output of social innovation

The review by Sharra and Nyssens (2010) revealed that all conceptions of social innovation outputs share the element of novelty, meaning that these innovations can be new to the user, context, or application. Social innovations are distinguished from inventions by the fact that they are 'in use' and contribute to human and social life (van der Have & Rubalcaba 2016) which is similar to market adoption that makes the difference between (technological) innovations and inventions.

Social innovations can be found along a formalisation continuum. On one end, one can find highly formalised social innovations that are well-defined and have specific properties (e.g. the ethical and modular smartphone by *Fairphone*). On the other end of the continuum one finds social innovations that are less formalised. These less formalised social innovations (e.g. minority empowerment program) are consisting of several services and smaller interventions that are continuously adjusted in response to the target group who act as co-creators (Choi & Majumdar 2015).

Furthermore, van der Have and Rubalcaba (2016) came to a similar observation as Choi and Majumdar (2014), which is that different streams of researchers investigating social innovation do support the idea that:

"[Social innovation] has an important commonality in sharing two 'core conceptual elements':
[social innovation] encompasses 1) a change in social relationships, -systems, or -structures,
and 2) such changes serve a shared human need/goal or solve a socially relevant problem"
(van der Have and Rubalcaba 2016, p. 1932).

More specifically, Choi and Majumdar (2014) state that *"the dimension of change processes points not only to sustainable and long-lasting, systemic changes induced by social innovations, but also to the contexts, settings, and their specific structures in which social innovations are embedded"* (p. 30). However, like any other actor engaged in innovation, also social innovators can experience resistance coming from different interests and power relations, or changing roles and mental models (ibid.).

Similarities and dissimilarities between responsible innovation and social innovation

Input

Science and technological development alone will not be able to tackle grand societal challenges (Sabadie 2014). Therefore, social innovations are increasingly understood as means to solve grand challenges in societies (Benneworth et al. 2015). Therefore, supported by the systematic literature reviews on social innovation, we argue that the grand societal challenges of our times do not only function as inputs for responsible innovation but also for social innovation. Responsible innovation is also initiated to accommodate the inherent uncertainty that comes with innovation. However, in the literature reviews we did not find any indications that this also holds for social innovation.

Throughput

Social innovation is partly overlapping with responsible innovation when it comes to anticipation. Social innovators aim to better understand the needs, dislocations, dissatisfactions and blockages of target beneficiaries, which subsequently helps in *"generating ideas […] and identifying potential solutions"* (Mulgan 2006, p. 149). Subsequently, social innovators find ways to bring the social change that is necessary to solve social problems that the people face (Sharra and Nyssens 2010). Social innovation seems to be less engaged in foreseeing detrimental implications that the innovation could bring.

Social innovation does reflect on the purpose for innovation and the ends that they want to achieve (Choi & Majumdar 2015). Furthermore, successful social innovators reflect on their actions and commitments as they evaluate the actual impact of their social innovations (Mulgan 2006). However, in the literature reviews we did not find any indications that social innovators engage in second-order reflexivity, meaning that they reflect how their own theories and value systems have an influence on the development

of their social innovation. This is where responsible innovation differs from social innovation, as responsible innovation aims to increase awareness of different perceived realities and value systems between stakeholders and innovators.

Social- and responsible innovation particularly stress the importance of stakeholder inclusion, especially the people who might be affected by the innovation. However, there are differences between social- and responsible innovation when it comes to the reasons for stakeholder inclusion. Social innovation involves stakeholders primarily for better understanding the social problem or the societal needs that have to be addressed by the innovation. The same holds for responsible innovation, but in addition responsible innovation includes stakeholders also to facilitate more pluralistic visions of the implications innovation (Ribeiro et al. 2016). This should not only involve envisioning beneficial implications but also possible detrimental implications. Furthermore, it seems that social innovation does not aim to involve all relevant stakeholders during an innovation process, as it primarily focuses on co-creation with its target beneficiaries. Besides, social innovation does not involve stakeholders to question the desirability of social change and enhanced social- and/or environmental well-being.

When it comes to responsiveness Mulgan (2006) found that successful social innovations are developed by engaging in trial-and-error, experimenting and following hunches; followed by developing, prototyping, and piloting first versions of the solution for further improvement. Social innovation often involves a collective response by stakeholders who cooperatively generate, select and implement ideas to solve a social problem (Dawson and Daniel 2010; Sharra and Nyssens 2010). Social innovations are continuously adapting to the context in which they are developed, and to the needs of its target beneficiaries who act as co-creators (Choi & Majumdar 2015). Target beneficiaries are especially involved as co-creators for social innovations that are less formalised.

Output

Responsible innovations and social innovations are both revolving around novel solutions that can take many forms. However, responsible innovation is primarily involved in the governance of science and technological development (Benneworth et al. 2015), whereas social innovation is about developing innovations that result in the social change necessary for solving social problems. Therefore, social innovation could be informative for opening-up the narrow view on innovation that can be found in responsible innovation research. Furthermore, researchers in social innovation distinguish social innovations from social inventions by stating that the latter are not in use. This cannot be said for the current notion of responsible innovation, which does not differentiate between responsible science and technological development. Hence, responsible innovation could also involve inventions by scientists that are not turned into marketable products yet.

2.4 Sustainability-related innovation

There is a rather diverse knowledge base coming from research on innovations that address sustainability, which includes concepts like green-, eco-, environmental- and sustainable innovation. These concepts are used interchangeably (Schiederig et al. 2012) even though there are different research communities that provide different lenses on how to innovate for sustainability (Franceschini et al. 2016)[6]. Schiederig et al. (2012) identified six aspects that are recurring in the different definitions of sustainable innovation concepts.

1. Sustainable innovations can appear in different forms like products, processes, services or business models.
2. Sustainable innovations have a market orientation, meaning that they satisfy needs and are competitive on the market.
3. Sustainable innovations should reduce environmental impact, preferably have no environmental impact
4. The full life-cycle of the innovation should be considered when assessing the sustainability effect of the innovation.
5. Sustainable innovations can be driven by economic or ecological motivations.
6. Sustainable innovations can set new standards of sustainability for firms.

Input of sustainability-oriented innovations

Sustainability-oriented innovation processes are initiated to pursue sustainable development. The International Union for Conservation of Nature (IUCN) was first to introduce the term sustainable development and defined it as *"the integration of conservation and development to ensure that modifications to the planet do indeed secure the survival and well-being of all people"* (Schiederig et al. 2012, p.181). More specifically, sustainable innovation is driven by grand challenges such as: increasing energy consumption, climate change, dependency on fossil fuels, pollution and water shortages (Charter & Clark 2007). The motivations to address the grand challenges can be driven by social or environmental motivations, but also economic motivations as companies can see potential competitive advantages by responding to the grand challenges (ibid). The latter is more present in research on green innovation that relates sustainable innovation more directly to management and competition objectives (Franceschini et al. 2016).

Throughput of sustainability-oriented innovations

Adams et al. (2016) conducted a systematic literature review to identify, analyse and synthesise sustainability-oriented innovation practices and processes at firm-level. They found firms can engage in sustainable

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[6] For more information regarding the history of sustainable innovation as a scientific concept and how different scientific communities influenced the scientific discourse on the concept, please see Franceschini *et al.* (2016) and Schiederig *et al.* (2012). Since this goes beyond the aim of this chapter, it will not be thoroughly discussed here.

innovation on three different levels. Firms at the lower level are engaging in operational optimisation and have an:

> *"internally oriented perspective on sustainability, referring to a 'doing the same things but better' approach directed toward reducing harm through reactive, incremental improvements driven by compliance or proactively pursuing efficiencies. These are activities characteristically technical, stand-alone and insular"* (Adams et al. 2016).

These companies could be of primary interests to scientists engaged in eco-innovation, as Franceschini et al. (2016) found that these scientists investigate issues around technology design and products that primarily lead to efficiency gains. Since responsible innovation aims to go beyond compliance (Stilgoe et al. 2013), we do not consider this level of sustainable innovation to be relevant for responsible innovation.

Firms at higher levels of sustainable innovation operate closer to the ideal of responsible innovation. Adams et al. (2016) state that at a higher level of sustainable innovation, firms include the social aspect into the notion of sustainability as well. The 'organisational transformers' involve companies that engage in innovation activities that are more people-oriented. Furthermore, their sustainability-oriented innovations are not treated as insular events, and the idea of sustainability is embedded throughout the firm and preferably along the value chain. A small but growing number of firms go even further and make a more radical shift in philosophy. These firms aim to think beyond the firm by reflecting with other stakeholders, including the public, on the role of their business and its innovations for a desirable future. These so-called 'system builders' focus more on developing networks of workable relations, including unconventional stakeholders and the public, who collaboratively create sustainability value. Such novel collaborations are important for engaging in dialogue, gaining legitimacy, finding opportunities for knowledge acquisition, and finding opportunities for responsive solutions (Adams et al. 2016).

Outputs of sustainability-oriented innovation

In the end, innovation processes result in sustainable innovations when the products, processes or business models have reduced negative externalities and preferably have no negative impact at all. In order to critically evaluate the impact of sustainable innovation, it is required that one takes the full life-cycle of the innovation into account (Schiederig et al. 2012).

The final outcomes of sustainability-oriented innovations can appear in many forms since they can be technological (like in eco-innovation), related to services (also known as servitisation), but also systems-shaping innovations that consist of interconnected sets of innovations (Mulgan & Leadbeater 2013). The implications of systems-shaping innovations are that they shift cities, sectors, economies or other systems on a more sustainable path (Draper 2013), which is necessary when addressing grand challenges.

Similarities and dissimilarities between responsible innovation and sustainable innovation

Input

Grand societal problems or wicked problems are not only inputs for responsible- and social innovations but also for sustainability-oriented innovations. This holds especially for system-shaping sustainable innovations, which are necessary for responding to grand challenges that are too large for single firms to solve on their own. Again, responsible innovation aims to accommodate for the uncertainty that innovations could have negative implications. However, in the literature reviews we did not find any indications that this also holds for sustainable innovation.

Throughput

Adams et al. (2016) state that organisations that start developing systems-shaping innovations initiate, mobilise, inspire and lead the change towards workable relationships with private, public and civil society partners. These workable relationships are not only important for constructive dialogues to collectively define the problem, but they are also beneficial for knowledge acquisition and the search for solutions (Mirata & Emtairah 2005). Furthermore, the discussions with stakeholders aim to steer innovations in the right directions by discussing the role that the firm and its innovations can play in desirable futures (Adams et al. 2016).

Organisations engaging in sustainability-oriented innovations do reflect on the outcomes of their innovations. Successful firms reflect on their actions and commitments by measuring and disclosing the impacts of the innovation. Furthermore, organisations reflect on the role that they can play in developing system solutions for complex grand challenges that they cannot solve on their own. These organisations are:

> *"leaving behind the prevailing economic paradigm to reframe the purpose of the firm in society: a part of society, not apart from it". [...] "They adopt a logic of collaboration and invest in system solutions to derive new shared value propositions from the entire socio-technical and ecosystem network to make a positive impact" (Adams et al. 2016, p. 192).*

It is therefore fair to assume that those organisations that are engaged in finding systems-shaping solutions think beyond their role responsibilities and reflect on their wider moral responsibilities as well, which is also a core characteristic of reflexivity in responsible innovation (Stilgoe et al. 2013).

Sustainability-oriented innovators engage in dialogues with stakeholders beyond their supply-chain, such as civil society actors and unconventional stakeholders like community action groups or social entrepreneurs. However, also important differences could be observed. While these stakeholders are included in sustainable innovation to better define the problem and its possible solutions, the literature does not suggest that they question the social, political and ethical implications of possible solutions. Therefore, it seems that the discussion focuses on desirable implications of sustainable innovation, while possible detrimental implications receive negligible attention.

Again, innovations involving operational optimisation are predominantly developed in response to legislation and regulation (Adams et al. 2016), which is not similar to responsiveness as it is understood in responsible innovation literature. Organisations engaged in organisational transformation or system-building innovations for sustainability, are more inclined to develop innovations that require mutual learning and collective problem solving (Adams et al. 2016). Firms are more successful in developing sustainable innovations if they are more responsive to weak signals coming from their immediate stakeholder environment. Not only does this require absorptive capacity and connections with stakeholders, but also proper internal knowledge management processes. Without proper knowledge management processes, firms will fail to develop system-changing solutions even though they do engage in stakeholder collaborations (Ayuso et al. 2011). While responsible innovation does acknowledge the importance of internal knowledge management processes, it remains underexposed in responsible innovation literature. It is even less discussed how to manage such processes. Seebode et al. (2012) found that organisations that want to develop system-shaping solutions need to learn how to follow novel pathways, how to work with other stakeholders, and how to find new ways of knowledge management. The advantage of sustainable innovation literature is that there is more practice-based information how organisations can engage in organisational learning, which remains underexposed in responsible innovation literature.

At the highest level of sustainable innovation, stakeholders are consulted during the earliest stages of innovation to find out how firms and innovations can play a role in desirable futures. However, the reviews did not provide any information how firms proceed after this initial stage. Therefore, it remains unknown whether innovators and stakeholders are mutually responsive throughout the innovation process. Research by Blok et al. (2015) confirms a tendency by firms to be transparent towards stakeholders and to deliberate with them during the initial stages of the innovation process and close to implementation of the innovation, but not during the stages in between. Therefore, there are no indications that sustainable innovation is a fully democratic and transparent innovation process like the ideal of responsible research and innovation aims to be.

Outputs

Sustainable innovations at a lower level focus on operational optimisation, which often result in technology-based innovations that lead to efficiency gains (Adams et al. 2016). However, recent sustainability oriented innovations increasingly involve systems-shaping solutions that consist of *"interconnected set[s] of innovations, where each influences the other, with innovation both in the parts of the system and in the ways in which they interconnect"* (Mulgan and Leadbeater 2013, p. 4). Adams et al. (2016) links this observation to Draper's conception of sustainability, which can be seen as *"set of actions that shift a system – a city, a sector, an economy – onto a more sustainable path"* (Draper 2013, p.11). Therefore, the similarity is that both responsible- and sustainable innovation involve complex innovations that enhance sustainable development.

However, the review by Adams et al. (2016) does not provide any evidence that sustainability-oriented innovations explicitly account for the normative anchor points of responsible research and

innovation like social justice, equality, and sustainable economic growth. Adams et al. (2016) state that some sustainability-oriented innovators even aim to depart from the economic paradigm. Therefore, future research could investigate what the role of these different normative anchor points are for innovation in business contexts.

An overview of the conceptual similarities and dissimilarities between responsible innovation and social- and sustainable innovation is presented in Table 1.

Table 1. Overview of the conceptual overlap and the differences between responsible-, social- and sustainable innovation

	Responsible Innovation	Social innovation	Sustainable Innovation
Input for innovation	The grand challenges (Burget et al. 2016; Von Schomberg 2014; Wickson and Carew 2014) The uncertainty regarding innovations' future impacts (Stilgoe et al. 2013) The embedding of innovation in society (Ribeiro et al. (2016) and Von Schomberg (2014))	The Social needs and problems that are not being met by the government or market actors (Choi & Majumdar 2015; Mulgan et al. 2007)	The climate-related grand challenges (Charter & Clark 2007) that are often complex (Adams et al. 2016) The business opportunity to increase profits by developing a sustainable innovation (Adams et al. 2016, Franceschini et al. 2016; Schiederig et al. 2012)
Throughput of innovation (i.e. the process)	Taking into account innovations implications and assessing alternatives (Wickson & Carew 2014) Reflecting on the effect of the underlying norms, values and beliefs on the innovation at stake (Stilgoe et al. 2013) Deliberating with stakeholders about the underlying norms and values that should guide the innovation in the desirable direction Or normative anchor points of the European Treaty are used as normative goals for responsible innovation Reflecting on activities, commitments and assumptions (Stilgoe et al. 2013)	Collectively defining the problem and searching for solutions (Mulgan 2006) and understanding the implications of social innovations (Sharra & Nyssens 2010) Deliberating by consulting whether the needs of target beneficiaries are met Assuming that values such as social equality and sustainability are desirable and translating them into innovation requirements Reflecting on the social impact and setting of new goals (Mulgan 2006)	Comparing different innovations' impacts based on full life-cycle assessments (Schiederig et al. 2012) and engaging in scenario thinking (Adams et al. 2016) Deliberating with stakeholders how the firm and its innovations can help to achieve system transformation for desirable futures (Adams et al. 2016). Reducing the environmental harm per unit (lower level). Including the social dimension in to sustainability next to environmental- and economic dimensions (medium level). Deliberating with stakeholders what desirable futures are and what role the firm & innovation could play (high level) (Adams et al. 2016). Assessing the impact of the innovation over its full life-cycle (Schiederig et al. 2012) and disclosure of its sustainability performance (Adams et al. 2016)

Table 1. *(continued)*

	Responsible Innovation	Social innovation	Sustainable Innovation
Throughput of innovation (i.e. the process)	Reflecting on wider moral responsibilities next to role responsibilities (Stilgoe et al. 2013)	Taking responsibility to solve societal needs and problems that others do not address (Choi and Majumdar 2014)	Reframing the purpose of the firm from being apart from society to being part of society (high level) (Adams et al. 2016).
	Involving and deliberating with the relevant stakeholders throughout a transparent innovation process (Von Schomberg 2012) to make better decisions and learn from each other (Wickson & Carew 2014).	Including stakeholders (primarily target beneficiaries) for better understanding of the addressed social need or problem (Sharra and Nyssens 2010; Choi and Majumdar 2014).	Including stakeholders to increase the knowledge base of the firm, to improve search activities, to enhance social legitimacy, and to develop responsive solutions (Adams et al. 2016). Helps to enhance mutual learning (Boons 2013) and improve decision-making (Bos-Brouwers 2010).
	Engaging with stakeholders in general and members of the public in particular (Owen et al. 2012; Stilgoe et al. 2013)	Deliberating with stakeholders in general and the target beneficiaries in particular (Mulgan 2006; Sharra and Nyssens 2010; Choi and Majumdar 2014)	Engaging with supply-chain partners [lower level]. Engaging with stakeholders that represent the innovation system during the earliest stages of the innovation process [higher level]. Members of the public are seldom involved to enhance foresight (Adams et al. 2016).
	Acting and adapting to the results from stakeholder inclusion and deliberation (Wickson & Carew 2014)	Generating, selecting and implementing innovative ideas with other actors to meet social challenges (Dawson & Daniel 2010). Less formalised innovations are developed and adjusted according to the innovation context and needs of target beneficiaries (Choi and Majumdar 2014).	Realising mutual responsiveness among supply chain actors [lower level]. Realising responsiveness by developing an innovation agenda that responds to the desirable futures projected by involved stakeholders [higher level].(Adams et al. 2016)
Output for innovation	Innovations that are societally desirable, sustainable and ethically acceptable (Von Schomberg 2014)	Innovations that enhance social- and/or environmental well-being (Sharra & Nyssens 2010; Choi & Majumdar 2015).	Innovations with reduced environmental impact on society, preferably none (Chalmers 2013; Schiederig et al. 2012) that balances social-, environmental- and economic considerations.

Table 1. *(continued)*

	Responsible Innovation	Social innovation	Sustainable Innovation
Output for innovation	Predominantly new and emerging sciences and technologies. Along a formalisation continuum from tangible (e.g. drones) towards intangible (e.g. financial products, GMO, etc.)	Innovations that induce the social change necessary for addressing the societal need or problem (Choi & Majumdar 2015) that are already implemented in practice (van der Have & Rubalcaba 2016) Social innovations can be found along a continuum of specificity of the innovation's properties & characteristics	Sustainable innovation goes beyond technological solutions and increasingly involves services and business-model and organisational innovation (Boons & Lüdeke-Freund 2013; Adams et al. 2016) Not only technology-based innovations but also other innovations. Sometimes sustainable innovation consists of a set of interrelated innovations (Adams et al. 2016) that shift a system onto a more sustainable path (Draper 2013)

2.5 Discussion and Conclusions

The aim of this chapter was to identify conceptual similarities and differences between responsible innovation and social- and sustainable innovation, and what this means for responsible innovation in business contexts. Due to the multiplicity of conceptualisations and definitions that can be found in each of the three innovation concepts, we considered it legitimate to base our conceptual analysis on literature reviews of responsible-, social- and sustainable innovation. The research objectives of the literature reviews that were consulted were different. For example, literature reviews aimed at analysing and synthesising innovation activities (e.g. Adams et al. (2016)) explicate the different understandings of innovation between scientific schools (such as Franceschini et al. (2016) and van der Have and Rubalcaba (2016)) or aimed at outlining the characteristics of innovation in different contexts (e.g. Choi and Majumdar (2014).

The findings from our conceptual analysis indicate that social- and sustainable innovation are conceptually overlapping with responsible innovation on several aspects of the input, throughput and output of innovation. However, the explicit focus on determining the underlying norms and values for innovation is what discriminates responsible innovation from social- and sustainable innovation. These underlying norms and values for responsible innovation can be determined based on the results of deliberation with all relevant stakeholders (i.e. procedural approach) or they can be predetermined (i.e. substantive approach).

The conceptualisations in the literature reviews of social and sustainable innovation indicate that both innovation concepts are primarily based on the substantive approach. For example, it is predetermined that social innovation encompasses innovations that create social change to serve a shared human need or to solve a societally relevant problem, which subsequently enhances social and/or environmental well-being (Choi & Majumdar 2015; van der Have & Rubalcaba 2016). Even though there is deliberated whether the societal needs are met, the aim of the deliberation is not to discuss values such as social equality and sustainability. It is also not deliberated whether values can be conflicting, or how values are translated into innovation requirements. Similarly, 'sustainability' revolves around reduction of environmental impact for the lowest level of sustainable innovators, whereas at the medium level the social dimension is included as well. However, a small, but growing, number of sustainable innovators involve stakeholders for consultation. Here they reflect on the role that the firm and its innovations could play in a future desirable society. While this approaches the ideal of responsible innovation, the reviews did not reveal if and how the innovation agendas of the firms are responsive to the stakeholders. One can question whether such consultation without formal vote or say is in accordance with the deliberative democracy that responsible innovation aims to achieve (Brand and Blok, forthcoming). While one can argue if such a democratic governance of innovation is desirable in societies outside Europe and North-America (Macnaghten et al. 2014) the major challenge is how to achieve democratic governance of emerging science and innovations (Stilgoe et al. 2013).

We argue that it is highly questionable whether a democratic governance of innovation in business contexts could be achieved in our current political and socio-economic system. First of all, because one cannot expect that companies become transparent during innovation as it will jeopardize the information

asymmetries on which their market opportunities depend (Blok & Lemmens 2015). Second of all, inclusion of all relevant stakeholders is questionable, because responsible innovations respond to grand challenges that involve a wide variety of stakeholders (Weber & Khademian 2008). In reality, companies can only manage a limited number of different stakeholders in their network (van Geenhuizen & Ye 2014). Third of all, the final decision-making authority regarding the innovation strategy is restricted to the company (Blok & Lemmens 2015) as the board is responsible for the return on investment, and has to act on behalf of its shareholders and serve shareholder interests. This dominant role of shareholders is even embedded in corporate law (Heath 2011). Hence, it is questionable if all stakeholders can be treated alike, not to mention if a company can be responsive to the demands of all stakeholders. In conclusion, since we question the possibility to meet the requirement of a democratic governance of innovation in business contexts, and since we did not encounter it in the literature reviews on social- and sustainable innovation, we propose not to consider democratic governance as a necessary condition for responsible innovation in business contexts.

Another reason why responsible innovation is dissimilar to social- and sustainable innovation is that it requires stakeholders to reflect on the innovation trajectory and on how this trajectory could be made responsive to the inherent uncertainty that comes with innovations. Even though Stilgoe et al. (2013) proposes that responsible innovation should not focus on negative implications (Ribeiro et al. 2016), it seems that it is still a point of difference between responsible innovation and social- and sustainable innovation. Therefore, we propose that the procedural approach that can be found in the current notion of responsible innovation should also apply for responsible innovation in business contexts.

However, there are important similarities between responsible innovation and social- and sustainable innovation. For example, responsible-, social-, and sustainable innovation provide insights how innovations can be developed that respond to the grand challenges, which can subsequently enhance social and/or environmental well-being. Social innovation is for example informative for finding out how to be responsive to the needs of target beneficiaries and how to co-create with them. Sustainable innovation is informative for developing system-changing solutions that respond to grand challenges, while taking the social-, environmental- and economic considerations into account. We see two reasons why social- and sustainable innovation can function as points of departure for our understanding of responsible innovation in business contexts. First, because the results of our analysis indicate that social- and sustainable innovation are conceptually overlapping with responsible innovation on multiple aspects regarding the input, throughput and output of innovation. Second, because research regarding social- and sustainable innovation is more practice-oriented and more embedded in business contexts than responsible innovation.

Based on evidence presented in the reviews on social- and sustainable innovation we derive two essential preconditions for effective implementation of responsible innovation in business contexts. These preconditions are based on the innovation practices of system-building firms that are described in the review by Adams et al. (2016), as these firms are currently innovating closest to the ideal of responsible innovation.

First of all, firms need to diffuse the notion of sustainability throughout the firm, and consider themselves part of society and not apart from it. This requires that the values and aspirations of the board and the owners are in line with the notion of sustainability. This notion is that sustainability is not an attribute

of a single firm, instead it can only be applied at systems level, which requires collaboration with actors from private industry, public sector and involves civil society partners and investment in systems solutions. This new approach to innovation needs to be communicated throughout the firm, and integrated in the incentives and reward systems of employees (Armstrong et al. 2012; Adams et al. 2016). These actions ensure that responsible innovation becomes part of the company culture (Armstrong et al. 2012). Social- and sustainable innovation literature can inform how this could be achieved at strategic and operational level. This is necessary since new research (Blok et al. 2016) shows the discrepancy between the implementation of responsible innovation at the strategic level and at the operational level in companies.

The novel collaborations with a variety of stakeholders help to engage in dialogue, gain social legitimacy, find opportunities for acquiring new knowledge, and also help to find creative and responsive solutions. However, even though firms might engage in stakeholder collaborations, they will fail to develop system-changing solutions if there is a lack of internal knowledge management processes (Ayuso et al. 2011). The stakeholders need to learn how they can find, form and perform within the new innovation systems (Adams et al. 2016). This can be done by experimenting and learning with new approaches to sustainability, while simultaneously maintaining the existing business model. This allows firms to adjust the knowledge management processes without risking their business model, while at the same time developing an effective management approach that integrates foresight and novel collaborations with stakeholders (ibid).

Which consequences does our proposal have for the concept of responsible innovation in business contexts? Responsible innovation in business context has a similar understanding of anticipation as the current conceptions of responsible innovation literature. Anticipation in responsible innovation in business contexts therefore involves proactive engagement in activities enhancing foresight that take place at the start of the innovation process (Stilgoe et al. 2013). Anticipation is about better understanding the dynamics between the innovation and the wider eco-system in which it is developed and implemented. This also requires that stakeholders are involved in the discussion about what they consider to be desirable futures, and what the roles are of the firm and its innovations in those futures (Adams et al. 2016). Additionally, it is important that not only the environmental and economic implications are taken into account, but also the social, political and ethical implications of the innovation. It is important to acknowledge that stakeholder inclusion and enhanced reflexivity does not necessarily lead to ethical outcomes and justifications (Pellé and Reber 2015) especially because it is unlikely that a democratic governance of innovation takes place in business contexts. Furthermore, responsible innovation should still take into account that innovation can have unforeseen negative implications as well. Adopting a more procedural approach whereby the norms and values guiding the innovation are scrutinised by others than the innovators themselves, could help to become aware of the socio-political and ethical implications of innovation. Unfortunately, the literature reviews did not reveal any information on how this can be achieved effectively when innovating in a business context.

Reflexivity in business contexts consists of two components. The first is measuring and disclosing the impact of the innovation, which can subsequently act as a driver for enhancing the performance of the innovation (Adams et al. 2016). This means that one assesses how the innovation performs compared to

the desirable implications that were discussed at the start of the innovation process. The second is reflecting on the firm's role responsibilities but also its wider moral responsibilities. Firms need to be aware that they are part of society and not apart of it. However, the reviews did not provide insights whether companies investigate how their value systems and theories influence the subsequent development of their innovations. Furthermore, they did not reveal if companies assess whether their processes of anticipation, reflexivity, inclusion and responsiveness are in line with public values. Therefore, we conclude that social- and sustainable innovation are not helpful for implementing this so-called second-order reflexivity as part of responsible innovation in business contexts.

Firms involve stakeholders in their innovation process for three reasons. First, to achieve better foresight thinking, and to reflect on the role of the firm and their innovations in society (Adams et al. 2016). Second, to translate their underlying values for innovation into innovation requirements that result in innovation outcomes that are aligned with the needs of the target group. Third, to be able to adjust their innovation in response to new knowledge and changing stakeholder needs (Adams et al. 2016). In line with some findings in responsible- and sustainable innovation, we argue that foresight thinking and reflecting on the role of the firm (and their innovations) in society will be beneficial if such discussions take place with stakeholders that are representative for society. However, it is not likely that this is taking place throughout the innovation process, instead this more likely takes place at the start of the innovation process. Furthermore, as already mentioned before, it cannot be expected that this innovation process is transparent.

Also, companies aim to develop innovations that respond to grand societal challenges and they aim to make sure that the innovation becomes properly embedded in society. Hence it is essential to deliberate with stakeholders about the role of the firm and its innovations in a desirable future. Social innovation is primarily engaged with the target beneficiaries who can act as co-creators, whereas sustainable innovation aims to include representative stakeholders of the innovation system during the earliest stages of the innovation. What follows from the literature reviews is that firms should engage in good working relationships with stakeholders as it allows them to quickly respond to weak signals such as new knowledge or changing stakeholder needs and values (Holmes & Smart 2009). It is the responsibility of the company that aims to develop the innovation to initiate, mobilise, inspire and lead the change towards workable relationships with stakeholders in order to achieve such a mutual responsiveness. Furthermore, companies need to find new ways to develop proper internal knowledge management processes, as well as processes that help to develop innovations that respond to grand challenges and changing stakeholder needs.

Some final remarks have to be made with regard to the conclusions of this chapter. This chapter reflects on the concept of responsible innovation and critically examines what it could entail in business contexts. This was done based on literature reviews regarding responsible-, social- and sustainable innovation for reasons explained throughout this chapter. However, it should also be noted that this approach has its drawbacks. For example, the literature reviews had different aims than this chapter, and were written from the perspective of social- or sustainable innovation, which is different from responsible innovation. These different aims and scientific lenses affect the analysis and synthesis of the literature, and subsequently the conclusions are being drawn in these literature reviews. Hence, it cannot be ruled out that

relevant information for the concept of responsible innovation was omitted from the results and conclusions of these reviews. We further have to acknowledge that the business context is portrayed in this chapter as a homogeneous entity. This was done to contrast responsible innovation in business contexts from the current notion of responsible innovation that focuses predominantly on science and technological development. However, we acknowledge that the business context is rather heterogeneous in practice. Nevertheless, we think that this chapter can serve as a starting point for further conceptualisation and subsequent implementation of responsible innovation in business contexts. Therefore, it aims to inspire future work by researchers and practitioners who are interested in responsible innovation in general, and business contexts in particular.

Table 2. Overview of the main characteristics of the current concept of responsible innovation and the main characteristics of responsible innovation in business contexts.

	Responsible Innovation	**Responsible Innovation in a business context**
Anticipation	Proactive foresight activities to understand system dynamics between innovation and innovation eco-system Stakeholder inclusion to envision desirable futures to steer innovations in desirable direction Being aware of possible negative (unforeseen) consequences	Proactive foresight activities to understand system dynamics between innovation and innovation eco-system Stakeholder inclusion to understand the role of the firm and its innovations in desirable futures Being aware of possible negative (unforeseen) consequences
Reflexivity	Reflecting on norms, actions and commitments Being aware of subjectivity of knowledge and that perceived realities are not universally held Reflecting on the effect of underlying value systems and beliefs on the development of the innovation	Measuring of the innovation's performance and disclosure of the results Reflecting on wider moral responsibilities next to role responsibilities
Inclusion	Inclusion of all relevant stakeholders including members of the public Involvement of stakeholders throughout a transparent and interactive process	Inclusion of stakeholders representing the innovation system, the target beneficiaries and preferably members of the public Openness towards involved stakeholders during the initial innovation stages and testing and launching the innovation. No transparency during the development of the business case and the innovation itself

Table 2. *(continued)*

	Responsible Innovation	Responsible Innovation in a business context
Responsiveness	The innovators and involved stakeholders are responsive to the results ensued from anticipation, reflexivity and inclusion. Mutual responsiveness by being co-responsible for the development and implications of innovation	Translation of desirable futures into requirements for innovation Adjustment of innovation in the light of new knowledge and stakeholder needs, especially target beneficiaries Focus on proper internal knowledge management processes Company remains primary decision-maker and responsible for the development of the innovation
Innovation output	Focus on science and technological advancements Innovation outcomes can be found along a formalisation continuum	Innovations that involve complex systems-shaping solutions (often consisting of interrelated sets of innovations) Innovations can be found along a formalisation continuum

Chapter 3

A Systematic Literature Review to Identify Innovation Practices For Implementing Responsible Innovation in a Business Context [7]

3.1. Introduction

Societies all over the world are facing grand societal challenges such as food security, ageing populations, energy demand and climate change. Nowadays, private industry is seen not only as part of the problem that societies face, but they are increasingly considered to be key for finding and developing solutions for societal grand challenges. Governments all over the world are therefore encouraging innovation in private industry (Adams et al. 2016) as innovation and technological development are increasingly seen as the panacea for grand societal challenges (Godin 2015).

However, one can question whether innovation is inherently good (Godin 2015). There is always the probability that innovations have unforeseen consequences (Stilgoe et al. 2013). For example, the effective insecticide DDT turned out to have detrimental consequences for the ecosystem over the long term. Innovations can have short-term advantages, but also come with dilemmas, questions and uncertainties regarding their development and their future implications. This especially holds true for innovations that are disruptive, complex and hard to understand for non-experts (Sutcliffe 2011). Even the most promising innovations can fail because the ethical and societal concerns that come with innovation, are not properly taken into account (Ribeiro et al. 2016).

Responsible innovation is a new concept that builds on governance approaches and innovation assessments that aim to take these ethical and societal concerns into account at the start of the innovation process. The main idea behind responsible innovation is to democratise innovation (Owen et al. 2013; Macnaghten et al. 2014; Armstrong et al. 2012) and realise deliberative forms of governance like stakeholder and public engagement (Stilgoe et al. 2013). Stakeholders and members of the public are involved upstream in the innovation process and encouraged to deliberate about the multiple futures and uncertainties that the innovation could bring or seek to bring. This upstream inclusion of stakeholders and the public, by deliberative forms of governance, can help to realise a collective responsibility to control and direct the innovation into a direction that is ethically acceptable, societally desirable and sustainable (Von Schomberg 2012). This is expected to enhance the chance of innovation adoption, better embedding of the innovation in society, and that the innovation delivers societal benefits (Ribeiro et al. 2016). Therefore, Stilgoe et al. (2013) define responsible innovation as *"taking care of the future through collective stewardship of science and*

innovation in the present" (p. 3) and in broader terms as 'innovation with society and innovation for society' (Owen et al. 2012).

However, the problem with the current concept of responsible innovation is that it is developed by researchers and policy makers (Burget et al. 2017) who focused primarily on the conduct of responsible science and technological development (Lettice et al. 2013) without differentiating between research, development and commercialisation (Pellé & Reber 2014). This poses important challenges for implementation of responsible innovation in a business context. First of all, focusing on science and technological development indicates a narrow view on innovation as other types of innovation are not considered, such as social innovations (Blok & Lemmens 2015). Second of all, commercialisation is an essential stage within the innovation process (Baregheh et al. 2009). Commercially-driven innovation processes differ from those in research due to the priority given to achieving economic impact. Furthermore, the interests and values of innovators in a business context may differ from others (e.g. researchers in academia) and R&D departments face different constraints regarding confidentiality and public image (Ribeiro et al. 2016). Therefore, the question still remains unknown as to how the current concept of responsible innovation can be implemented in business contexts.

Responsible innovation is a rather new and emerging concept and documentation of its implementation in business contexts is still scarce. However, documentation about related investigations in the fields of social- and sustainable innovation in business contexts is more common (Choi & Majumdar 2015; Caulier-Grice et al. 2012; Adams et al. 2016). Like responsible innovation, social- and sustainable innovation also aim to respond to societal grand challenges. Furthermore, they require the involvement of multiple stakeholders, and they consider social- and environmental impact in addition to economic impact as desirable innovation outcomes (Lubberink et al. 2017a). The scientific documentation of social- and sustainable innovation in business contexts can be informative for the conceptualisation and understanding of responsible innovation in business contexts.

Therefore, the purpose of this chapter is to identify innovation practices and processes that can help to implement responsible innovation in business contexts, given the current political and socio-economic system. Even though it is highly relevant to reflect upon the political and socio-economic system and how it relates to responsible innovation, it goes beyond the scope of this review. The purpose of this review is met by identifying, analysing and synthesising findings in empirical studies that reported social-, sustainable- and responsible innovation practices and processes in business contexts. This can subsequently be used to provide guidance on achieving responsible innovation in a business context. To this end, we follow a similar review approach in this research chapter as is published in Adams et al. (2016), which consists of three stages:

Stage 1: Developing an initial architecture for reviewing responsible innovation. Drawing primarily on the governance framework of responsible innovation developed by Stilgoe et al. (2013), we describe the initial conceptual framework for responsible innovation. This initial framework forms the basis for identifying, analysing, and synthesising the innovation practices and processes that are presented in the findings from

included studies. Since responsible innovation is developed in a European context, and cannot be used as an a priori framework beyond this context (Macnaghten et al. 2014), we delimited this review to articles that report empirical research of innovation practices and processes in the 'global North'.

Stage 2: Systematic review of responsible innovation practices in a business context. We systematically review (Denyer & Tranfield 2009; Gough et al. 2012) the literature on responsible-, social- and sustainable innovation in a business context published between 1999 and 2015. Social- and sustainable innovation are included since documentation of responsible innovation practices in a business context is scarce, and social- and sustainable innovation share conceptual similarities with responsible innovation when it comes to their input, throughput, and output of innovation. The conceptual overlap is more elaborately explained in stage 1.

Stage 3: Framework synthesis. We adopt a framework synthesis methodology for our systematic literature review where we aim to refine and give practical substance to the initial framework for responsible innovation presented in stage 1. This refinement is based on a synthesis of innovation practices and processes reported in the findings of included empirical studies. This leads to a refined framework that is supported with innovation practices and processes that firms can implement to realise responsible innovation in business contexts.

The remainder of this chapter is structured in the following way. In stage 1, we present a brief outline of the literature on responsible innovation and elaborate upon its dimensions. These dimensions form the building blocks of the initial 'architecture' for reviewing responsible innovation. Subsequently, the concepts of social innovation and sustainable innovation are explained and supported with argumentation as to why they overlap conceptually with responsible innovation. In stage 2, we explain the scope of the review, the research design, quality appraisal, and the synthesis approach. This is followed by stage 3, where we present the innovation activities that help to implement each dimension of responsible innovation in business contexts. The paper concludes with a discussion on the implications of our findings for researchers and practitioners interested in responsible innovation in business contexts.

3.2. Stage 1: Developing an initial architecture for reviewing responsible innovation

Responsible innovation

Responsible innovation is a new concept that is developed and introduced in a top-down manner by policy makers and scientists (Zwart et al. 2014). However, the concept is interpretively flexible and there are competing narratives. Burget et al. reviewed the literature on responsible innovation and observed that policy makers and scientists defined and conceptualised responsible innovation in different ways (Burget et al. 2017). After analysing and synthesising the literature, they conclude that: *"Responsible Innovation is essentially an attempt to govern research and innovation in order to include all the stakeholders and the public in the early stages of research and development. The inclusion of different actors and the public is, in turn, meant to increase the possibilities to anticipate and discern how research and innovation can or may benefit society as well as prevent any negative consequences from happening"* (p. 15).

Owen et al. (2012) and Stilgoe et al. (2013) focus on achieving a democratic governance framework for innovation that is based on reflecting on the purpose(s) of the innovation as well as focusing on avoiding detrimental implications (Ribeiro et al. 2016). Von Schomberg (2012) has a similar focus on a democratic governance of innovation and defines this process (i.e. the throughput) as: *"… a transparent, interactive process by which societal actors 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)"(P. 9).*

What does this mean for the initial architecture that is used to review the responsible innovation literature? Although different approaches to responsible innovation exist (Burget et al. 2017; Gianni & Goujon 2014; Wickson & Carew 2014) such as Technology Assessment and Impact Assessment (Ribeiro et al. 2016), the framework for responsible innovation developed by Owen et al. (2012)) and Stilgoe et al. (2013) is one of the most dominant approaches in responsible innovation literature (Ribeiro et al. 2016; Burget et al. 2017). Their framework consists of four dimensions: anticipation, reflexivity, inclusion & deliberation, and responsiveness. These four dimensions can be used heuristically for anticipatory governance of innovation, and are the characteristics of a more responsible vision of innovation (Stilgoe et al. 2013). The fact that these dimensions are recurring throughout responsible innovation literature underwrites the influential role that their framework has in the field of responsible innovation (Burget et al. 2017). Therefore, these four dimensions are used as building blocks for our initial architecture to review responsible innovation practices.

Anticipation

Anticipation involves system thinking about any known, likely, plausible and possible implications of the innovation that is to be developed (Stilgoe et al. 2013), which requires that innovators understand the dynamics that help to shape the innovation (Burget et al. 2017). The aim is to envision desirable futures -- because futures cannot be predicted-- and organise resources to steer the innovations in the right direction. This requires early inclusion of stakeholders and the wider public who engage in *"a dedicated attempt to anticipate potential problems, assess available alternatives"* (Wickson & Carew 2014, p.2).

Reflexivity

Reflexivity is about critically scrutinising one's own activities, commitments and assumptions, and being aware of the limits of knowledge and the fact that one's reality might not be universally held (Stilgoe et al. 2013). Furthermore, innovators are expected to engage in second-order reflexivity, where they scrutinise how their underlying value systems and beliefs influence the development of the innovation. In the end, innovators should not only live up to their role responsibility but also their wider moral responsibilities (Stilgoe et al. 2013; Pavie et al. 2014). Reflexivity can be enhanced by early inclusion of stakeholders and the public who deliberate about the innovation at stake (Wickson & Carew 2014).

Inclusion and Deliberation

Inclusion and deliberation resonate in all articles on responsible innovation as they are associated with the other dimensions (Burget et al. 2017). It is about upstream engagement of stakeholders and the wider public to open up discussions and to interrogate the social, political and ethical implications that the development of the innovation would bring (Stilgoe et al. 2013). One could say that responsible innovation involves an *"active engagement of stakeholders for the purpose of substantively better decision-making and mutual learning"* (Wickson & Carew 2014, p.2).

Inclusion and deliberation are used interchangeably in the articles by Stilgoe et al. (2013) and Owen et al. (2013). However, Pellé & Reber (2014) question this lack of distinction between inclusion and deliberation in responsible innovation literature. Stakeholder inclusion and deliberation can have competing objectives and can therefore even be in conflict with each other (Papadopoulos & Warin 2007). Van de Kerkhof (2006) states that *"deliberation refers to a process of argumentation and communication in which the participants engage into an open process in which they exchange opinions and viewpoints, weigh and balance arguments, and offer reflections and associations"* (p. 282). Therefore, one could say that stakeholder inclusion focuses more on questions surrounding who to involve, during which stage of the innovation process, and whether the stakeholder network is representative. Whereas deliberation focuses more on the actual discussions that should lead to decision-making, and pays less attention to obstacles for inclusion or representativeness of the stakeholder network (Papadopoulos & Warin 2007). The political part of deliberation is central to responsible innovation, and ideally stakeholders would be able to negotiate the terms of their inclusion and deliberation, including the politics of deliberative engagement. For example, to discuss the substantive bias in responsible innovation that ethical concerns outweigh economic concerns (van Oudheusden 2014).

Responsiveness

Responsiveness is about having the capacity to change the shape or direction of the innovation in response to values of stakeholders and the wider public. Furthermore, it requires a collective institutionalised response and co-responsibility for responsible development of the innovation (Owen et al. 2013) in the light of new knowledge, perspectives, views and norms that emerge during the innovation process. In other words, there should be a *"a willingness among all participants to act and adapt according to these ideas"* (Wickson & Carew 2014, p.2).

Social innovation

Social innovation is a commonly but not consistently used term by scientists (Moulaert et al. 2005) as it is conceptualised and defined in different ways (Cajaiba-Santana 2014; Choi & Majumdar 2015) by different streams of scholars (van der Have & Rubalcaba 2016). The term is used as synonymous for intended and unintended social change, while it is used as a synonym for intangible innovations as well. However, after reviewing the literature on social innovation, Choi and Majumdar (2014) were able to conceptualise social

innovation in the entrepreneurial context (Choi & Majumdar 2015). They state that social innovations are: *"explicitly aiming at the creation of social value and thus at positive social change. Hence, in this case, the 'social' denotes that the purpose of social innovation is to meet pressing social needs and to improve human and environmental well-being" (p.27)*.

Lubberink et al. (2017a) identified conceptual similarities and dissimilarities between responsible-, social- and sustainable innovation based on a conceptual analysis of published literature reviews of these three innovation concepts. They conclude that social innovation overlaps conceptually with responsible innovation, especially when it comes to the drivers for innovation and the outcomes of social innovation processes. For example, social innovations are also driven by the desire to solve grand challenges and to respond to pressing social needs. Furthermore, social innovation aims to enhance social and/or environmental well-being. Stakeholder engagement and deliberative approaches also take place in social innovation. For example, less formalised social innovations are often developed based on co-creation with target beneficiaries (Choi & Majumdar 2015). Furthermore, social innovation can expand the narrow view of innovation that can be found in responsible innovation literature. The literature review by Choi and Majumdar (2014) provides an overview of the different types of innovation outcomes.

The fact that social innovation can serve as a useful resource for our understanding of responsible innovation does not only ensue from its conceptual similarities. Social innovation is not a new phenomenon (Godin 2015; Mumford 2002) and it is conceptualised and defined by practitioners (Caulier-Grice et al. 2012). As a result, research on social innovation is often practice-oriented (Choi & Majumdar 2015). Due to the conceptual overlap, and the fact that it is documented in business contexts, we argue that studies on social innovation in a business context can serve as an important resource for studying responsible innovation practices in business contexts.

Sustainable innovation

Sustainable innovation is a concept consisting of several approaches to sustainability-related innovation like green-, eco-, environmental- and sustainable innovation (Schiederig et al. 2012; Franceschini et al. 2016). Schiederig et al. (2012) reviewed the literature on sustainability-related innovation and concluded that sustainable innovations appear in different forms like products, processes, services or business models. They have a market orientation, meaning that they satisfy needs and are competitive on the market. The motivations to engage in sustainable innovation can be economic or ecological. Furthermore, sustainable innovations reduce environmental impact and preferably have no negative environmental impact at all. The full life-cycle of the innovation should be considered to assess the environmental impact. In the end, they can set new standards of sustainability for firms (Schiederig et al. 2012).

Based on a conceptual analysis of literature reviews on responsible- and sustainable innovation, Lubberink et al. (2017a) came to the conclusion that sustainable innovation overlaps conceptually with responsible innovation. Sustainable innovations are also initiated in response to grand societal challenges, and commonly climate-change related challenges. Furthermore, sustainable innovation increasingly

addresses complex challenges which require the development of complex systems-shaping solutions. Adams et al. (2016) state that these solutions require workable relationships with a complex network of stakeholders (Adams et al. 2016). In exemplary cases of sustainable innovation these often include actors beyond the conventional value chain. Managing such a stakeholder network enables engagement in a dialogue, to gain legitimacy, to acquire necessary knowledge and to find opportunities for responsive solutions (Adams et al. 2016). However, not only Lubberink et al. (2017a) but also Adams et al. (2016) explicitly state that sustainable- and responsible innovation are both focused on sustainability as a desirable outcome of innovation. Studies regarding green- and eco- innovation research are primarily focused on the environmental and economic dimensions as innovation outcomes (Franceschini et al. 2016). However, sustainable innovation responds to the triple-bottom-line and increasingly integrates the social dimension of sustainability in innovation processes and subsequent outcomes as well (Adams et al. 2016). Therefore, it can be concluded that both responsible innovation and sustainable innovation not only take the economic and environmental dimension into account as innovation outcomes but also the social dimension.

The fact that sustainable innovation can serve as a useful resource for our understanding of responsible innovation does not only ensue from its conceptual similarities. The fact that corporate sustainable innovation has already received considerable attention from researchers, managers, and policy makers (Adams et al. 2016) is another important reason. Due to the conceptual overlap and the fact that sustainable innovation is already widely documented in business contexts, we argue that studies on sustainable innovation can serve as important resources for studying responsible innovation practices in business contexts. An overview of the conceptual differences and similarities between the three innovation concepts can be found in Table 1 located in Chapter 2.

3.3. Stage 2: Systematic review of innovation activities for responsible innovation

Methodology

In this chapter, we conduct a systematic literature review of empirical research on social-, sustainable- and responsible innovation. This means that an algorithm was used to search for the empirical literature and the subsequent critical appraisal of the literature. Since this approach is transparent and reproducible, it enhances the quality of the review process and its findings (Tranfield et al. 2003). There are five steps that need to be taken to produce a systematic literature review (Denyer & Tranfield 2009). Following Denyer and Tranfield (2009), this means that we address: question formulation; locating studies; study selection and evaluation; analysis and synthesis; and reporting the results.

Question formulation

The systematic literature review has to be based on reported innovation activities coming from empirical studies in a business context. These empirical studies should include an investigation of responsible-, social- or sustainable innovations developed *with* society or that are *for* society. More specifically, it involves an

evidence-based investigation of innovation activities (and underlying mechanisms) that foster the implementation of: anticipation, reflexivity, inclusion, deliberation, and responsiveness during innovation practices in business contexts.

The data analysis approach that forms the basis of the review depends on the review objective. The objective is to answer the following research question: What are the innovation activities firms engage in that help to implement the dimensions of responsible innovation? The following review questions were therefore guiding the analysis:

- What innovation activities are reported by researchers who empirically investigated responsible-, social- and sustainable innovation in a business context?

- Which of these activities are beneficial for the implementation of responsible innovation dimensions?

- What are the mechanisms at play behind these innovation activities?

Corresponding with the nature of these review questions, we chose to pursue a more qualitative analysis of the results that are reported in the empirical studies. Therefore, a descriptive methodology is more appropriate as opposed to the statistical methods that can be found in meta-analyses. Furthermore, the collected data (i.e. the results reported in the empirical studies) are primarily qualitative by nature, which requires a corresponding data analysis and synthesis approach.

Locating studies

The search strategy started with a background search to explore the literature, which was followed by an initial investigation as to whether the empirical evidence in the articles was appropriate for answering our questions. Given the plurality of meanings and usages of the terms responsible-, social- and sustainable innovation, we made sure that the search strings encompassed a variety of keywords in combination with Boolean operators (see Figure A-1. in the Appendix A). The keywords and search strings were developed and refined in collaboration with a research methodologist specialised in systematic literature reviews. The keywords were determined based on the expertise of the researchers and additionally a thesaurus was consulted to include other related keywords. Subsequently, the comprehensive literature search was done based on three predefined algorithms[8].

This review involves a systematic literature search through various databases. The electronic databases that were used are: Scopus, Web of Science and Abi/Inform, the latter covering especially business studies. The Bielefeld Academic Search Engine was used to access the grey literature in the emerging field of responsible innovation research. Furthermore, the non-indexed Journal of Responsible Innovation was hand-searched for evidence of responsible innovation in business contexts as well as a special issue on 'responsible innovation in the private sector' in the Journal on Chain and Network Science. Furthermore,

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[8] These algorithms were adapted to fit each electronic database as the search mechanisms behind in each of these electronic databases are slightly different.

since a systematic literature review is a time consuming scientific activity, there is an inherent timespan between the latest systematic search for the literature review and the submission for publication. Because responsible innovation is a new and upcoming concept, this means that some articles are published after the systematic search for the literature was conducted. Therefore, a non-systematic literature search took place at the time of submission to identify, analyse and synthesise the latest empirical articles that investigated responsible innovation in business contexts. The insights obtained from this non-systematic literature review are presented in the discussion.

Study selection/evaluation

The document types that are included in the review are: articles, review articles of empirical studies, conference papers, articles-in-press and relevant chapters published in books. The inclusion criteria are: articles based on empirical research; companies are included as research subjects; addresses responsible-, social- or sustainable innovation; involves CSR related to innovation management. The exclusion criteria are: articles written in languages other than English, German and Dutch (due to proficiency of the authors); articles on policy making, education, economics or CSR not related to innovation; articles that do not pass the quality appraisal. Furthermore, this review is delimited to the 'global North' and articles in research contexts beyond the United States, Canada, Europe, Australia and New Zealand were therefore excluded, since responsible innovation should be sensitive to the socio-political context in which innovation takes place (Macnaghten et al. 2014).

The articles that were retrieved were screened for appropriateness based on the title, abstract and keywords. Three researchers independently screened a subset of 75 articles for appropriateness based on the inclusion and exclusion criteria. Discussions took place between the researchers when differences were encountered in terms of inclusion or exclusion of articles. This was done until an interrater agreement of at least 80% of the articles was reached. The corresponding author subsequently continued the screening of the data based on the results of the discussion. The articles that passed the title-abstract-keywords screening were subject to quality appraisal.

The quality appraisal criteria in a realist synthesis are subordinate to the usage and usability of the selected study, hence the contribution that a paper can make to the data synthesis (Pawson et al. 2004; Walshe & Luker 2010). Therefore, similar to the realist synthesis by Walshe & Luker (2010), this study adopts the same four questions proposed by Boaz & Ashby (2003) for the quality appraisal: 1) Is the research presented in such a way that it can be appraised and used by others? 2) Is the research methodologically well executed? 3) Does the research approach match the defined purpose of the study? 4) Does the research address important innovation questions in a way that is both useful and useable? The articles were first appraised based on usefulness and usability (question 4). Studies that did not match the purpose of this review were excluded and therefore also not assessed based on the other three appraisal questions.

Analysis/synthesis

In line with Rycroft-Malone et al. (2012), we started by extracting the data and clustering it into evidence tables. The initial 'architecture' for reviewing the literature was used for extracting the data and subsequent clustering in evidence tables. Hence, innovation activities that were associated with anticipation (e.g. double flow scenario method (Gaziulusoy et al. 2013)) were clustered under this label. Accordingly, the same was done for innovation activities that could enhance reflexivity, inclusion, deliberation and responsiveness. This was done with the help of Atlas.ti software package, which allows labels to be assigned to the activities that were described in the findings of the empirical articles. Furthermore, it allows these labels to be clustered and can generate an evidence table with the data clustered for each individual dimension.

Subsequently, the evidence for each dimension was investigated to understand the attributes of the innovation activities, the context in which it is implemented, and what their benefits are. This way of working made it possible to look for connections across the data and themes to get a cumulative picture of the activities that were described in the different empirical papers. Subsequently, this allowed us to analyse and synthesis evidence-based innovation activities that help to implement the dimensions of responsible innovation in a business context. The formulations of these activities are presented in the results of this review chapter.

Descriptive summary

The initial search for literature resulted in 1210 articles. The title, abstract and keywords were downloaded for each of these 1210 articles. There were subsequently 955 articles excluded based on the inclusion and exclusion criteria. Full paper assessments were done on the remaining 255 articles; of which 90 articles did not meet the inclusion and 20 papers could not be fully obtained via internet or libraries. The quality appraisal was therefore done on 145 full papers. There were 19 articles that did not meet the quality criteria proposed by Boaz & Ashby (2003). Another 58 articles were not considered useful and/or usable after appraisal. During the final stages of the review, the literature search and appraisal was repeated for new publications in the field of responsible innovation, as the literature base in this field is growing significantly. The relevant articles were subject to quality appraisal. This has ultimately led to the inclusion of 4 additional articles. Therefore, the data analysis for the realist synthesis is based on 72 articles. Figure 3 shows a flow diagram that represents the process of identifying, selecting and evaluating empirical articles for the literature synthesis.

Phase 1. Title-Abstract-Keywords screening

Articles obtained initial literature search (n=1210)

Not on topic (n=320)

Not empirical (n=172)

Not in geographical scope (n=76)

Duplicates between soc/ sust/resp Innovation (n=13)

Wrong document type or language (n=51)

Not business as research subjects (n=146)

Phase 2: Full-paper assessment

Articles for full paper assessment (n=255)

Not meeting inclusion criteria (n=90)

No access to full paper (n=20)

Articles for quality appraisal (n=145)

Not appraisable, well executed or right approach (n=17)

Other reasons (n=2)

Not useable (n=58)

hand search for responsible innovation literature (n= +4)
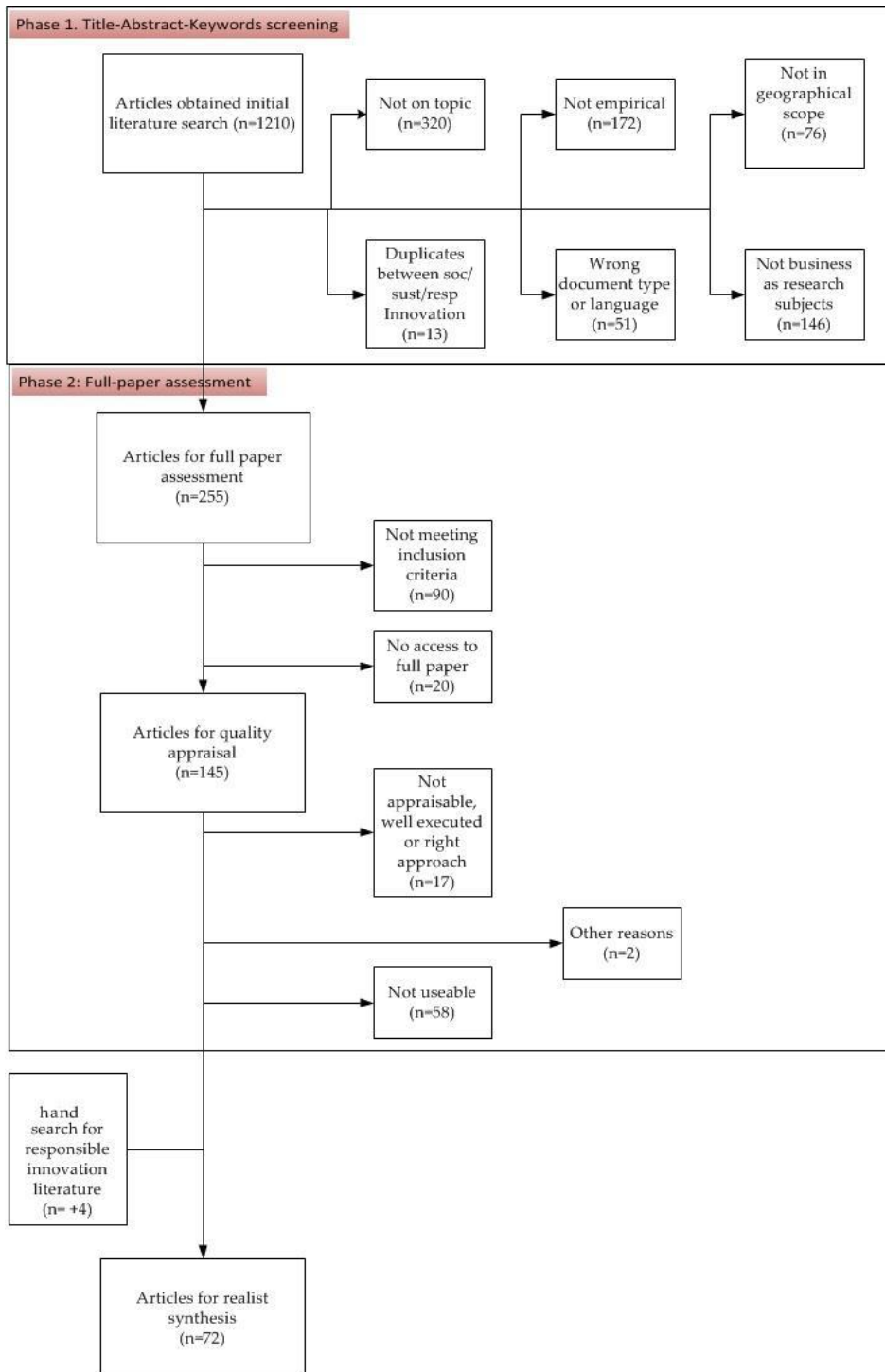
Articles for realist synthesis (n=72)

Figure 3. *Flow diagram of study selection*

The included articles are widely distributed when it comes to the type of innovation studied, the origin of the companies studied, and the size of the companies studied. Of the academic literature, there were 34 articles that presented findings on sustainable innovation. There were 26 articles that presented findings on social innovation, and 12 studies focussed on responsible innovation. The majority of the papers (n=42) were based on European companies, while studies including only American companies were underrepresented (n=13). There were 14 studies that were conducted based on data coming from companies from multiple continents.

Within the sample there is a relatively even distribution when it comes to the type of companies that are studied. The majority of the articles focus on systems of innovation in which private industry is participating (n=23), while 20 articles focus on large firms and 15 studied Small and/or Medium Sized Enterprises. Studies that focused on both large firms and SMEs (n=6) or that did not define the type of companies investigated (n=8) are underrepresented.

The fields of responsible-, social- and sustainable innovation are relatively young. There were 53 articles that are based on case study research, and 4 articles were the result of mixed-methodology research. Only 15 articles were based on survey data. The fact that most articles are based on case studies indicates that the research in these fields is largely focused on empirical exploration and description. The fact that these fields of research are primarily built on empirical exploration and description indicates that they are still in their infancies (Adams et al. 2016). The fact that all included articles (except one) are published from the year 2000 and onwards, with a sharp increase since 2010, supports this.

3.4. Stage 3: Framework Synthesis – Final Model of Responsible Innovation in Business Contexts

The dimensions of the current concept of responsible innovation were used as the initial 'architecture' for responsible innovation in business contexts. The final model of responsible innovation in business contexts is based on deductive and inductive analysis. The latter took place to identify recurring actions that are vital for innovating with society and for society, but are beyond the scope of the initial dimensions. There were multiple knowledge management activities recurring in the articles; activities that were implemented to solve knowledge gaps necessary to develop the innovation (as opposed to socio-ethical considerations). For example, to obtain missing knowledge on the recycling of plastics that is necessary for the desired innovation outcome (Larson 2000) or to obtain knowledge about biotechnical process engineering for sustainable innovations in the biopolymer industry (Chadha 2011). There were multiple recurring activities and mechanisms focused on resolving such knowledge gaps, which were therefore coded based on the framework of knowledge management typologies by Denford (2013). The outline of the results based on our synthesis presents the following dimensions respectively: anticipation, reflexivity, inclusion, deliberation and responsiveness. The results section is expanded by adding an overview of the key activities and mechanisms for the knowledge-based dynamic capability.

Anticipation

There are two important mechanisms that stand out when it comes to anticipating the future implications of the innovation and linking it to current decision-making processes. First of all, organisations engage in multiple activities that enhance their understanding of the innovation context (i.e. societal trends, market trends, technological developments, legislation & regulations) (Gaziulusoy et al. 2013; Bartlett 2009; Bocken et al. 2013; Chadha 2011; Chalmers & Balan-Vnuk 2013). Second of all, organisations engage in activities that improve their long-term vision and enable them to align it with their decision-making processes for innovation (Gaziulusoy et al. 2013; Steen et al. 2014; Rohrbeck et al. 2013; Asante et al. 2014).

Firms implemented several activities to get a better understanding of the innovation context. They monitor their external environment to identify changes in the innovation context (Chadha 2011) or via activities that helped them to understand the different contextual layers (Acs & Sany 2009). This is important in trying to understand how the development and implementation of innovation is interrelated with the innovation context (Gaziulusoy et al. 2013; Rohrbeck et al. 2013). Scenario methods can help to achieve this (Steen et al. 2014; Gaziulusoy et al. 2013) such as the double-flow scenario method (Gaziulusoy et al. 2013) which is beneficial for *"understanding the hierarchical irreversible relationships between the environment, society and economy, issues threatening the sustainability of the society and the implications of these on their organization. [And] generating normative long-term visions of sustainable societies and developing scenario maps to identify alternative innovation paths between present and these visions" (p. 114).*

In addition to understanding the innovation environment, it is important to understand the social needs or the problem to be addressed. Especially with regard to the social context, organisations aim to interact with people to better understand their needs (Bartlett 2009; Chalmers & Balan-Vnuk 2013; Edwards-Schachter et al. 2012). However, there is ambiguity whether companies address societal needs and/or (potential) customer needs (Ayuso et al. 2006; Bartlett 2009). Some firms visit communities that they aim to serve (Bartlett 2009) or develop a platform where members of the public can express their needs or concerns (e.g. a living lab (Edwards-Schachter et al. 2012)). Subsequently, companies aim to generate innovative ideas that respond to the expressed needs or problems. Traditional ways like 'pen and pencil', brainstorming activities and idea boxes are still used to generate innovative ideas (Bocken et al. 2014). However, there are also examples of multi-stakeholder ideation (e.g. Crowdsourcing of focus groups) that are initiated to generate innovative ideas together with the target group or consumers (Füller et al. 2012; Franke et al. 2013; Hansen et al. 2011; Dossa & Kaeufer 2014). Another innovation that can help to develop innovative ideas is collaborative business modelling (Rohrbeck et al. 2013), which *"creates a powerful platform for: 1) jointly identifying economic and societal value; 2) defining value creation/value capture systems; 3) planning of complex and uncertain future markets" (p. 4).*

While companies are primarily engaged in thinking about the desirable innovation outcomes, they are also aware of possible unforeseen consequences that come with innovation. They engage in several coping mechanisms implemented to reduce that uncertainty (Berker 2010; Biondi et al. 2002; Chadha 2011; Rohrbeck et al. 2013). These uncertainties are primarily articulated in terms of innovation rejection, whether

sufficient knowledge is at hand to develop the innovation, or other uncertainties that can be linked to business concerns (Baba & Walsh 2010; Berker 2010). Only a few articles reported innovation activities that aimed to reduce the uncertainty that innovation can have negative implications for the innovation environment (e.g. Bocken et al. (2013)). Organisations adopt different strategies to create (more) predictable conditions for the change that the innovation could bring (Berker 2010). There are also companies that adopt strategies to overcome or prevent competency lock-in that is associated with innovation uncertainty (Chadha 2011).

Subsequently, when the interrelationship between the innovation and its environment is clear, it is important that actors develop roadmaps consisting of different alternative ways in which the desired impact can be achieved (Gaziulusoy et al. 2013; Arnold & Hockerts 2011; Arnold 2010; Rohrbeck et al. 2013). The focus then is on translating organisational vision into innovation requirements, and subsequently day-to-day activities for development. Therefore, in the end we can define anticipation as: the act of determining the desired impact(s) and outcomes of the innovation process to address societal and/or environmental needs (1), the negative impacts to be prevented or mitigated (2), and the uncovering of the different pathways through which this can be achieved (3) while being aware of the inevitable uncertainty of forecasting.

Table 3. *Operationalisation of the dimension anticipation.*

Key activities	Strategies	Examples of reviewed papers where key activities and indicators are described
1. *Determining desired impacts and outcomes of innovation*	• Monitoring the innovation environment (legislation, technologies, market/societal trends and supply chain)	• Monitoring environment (Chadha 2011; Biondi et al. 2002) and Stakeholder mapping (Bocken et al. 2013; von Weltzien Hoivik 2011)
	• Identifying and understanding societal and/or environmental needs	• Identification of societal needs (Arnold 2010; Edwards-Schachter et al. 2012)
	• Generating ideas for solutions; determining the outputs & impacts to be achieved; and the subsequent social, environmental and/or economic value proposed	• Multi-stakeholder idea generation (Rohrbeck et al. 2013; Steen et al. 2014; Franke et al. 2013; Füller et al. 2012),Individual or collective idea generation (Bocken et al. 2013; Gaziulusoy et al. 2013; Ortega et al. 2014) Internal firm idea generation (Bocken et al. 2014)
2. *Preventing or mitigating negative impacts*	• Monitoring the innovation environment (legislation, technologies, market/societal trends and supply chain)	• Assessment of risks, uncertainties and impacts of the innovation (Baba & Walsh 2010; Eccles & Serafeim 2013; Weisenfeld 2012)

Table 3. *(continued)*

Key activities	Strategies	Examples of reviewed papers where key activities and indicators are described
2. *Preventing or mitigating negative impacts (continued)*	• Assessing risks, uncertainties and influence of external forces on the development and impact of the innovation	• Dealing with value missed and value destroyed, sensing the external environment (Bocken et al. 2013)
	• Assessment of possible negative consequences of the innovation	• Dealing with adverse effects (Wodzisz 2015; Eccles & Serafeim 2013)
3. *Development of roadmaps for impact*	• Developing forward and backward scenarios by taking into account long-term vision and short-term actions	• Visualising scenarios (Steen et al. 2014) and Double-flow scenario method (Gaziulusoy et al. 2013)
	• Plausibility assessment of the different scenarios	• Double-flow scenario method (Gaziulusoy et al. 2013)
	• Developing and determining an ambitious and conceivable roadmap regarding firm's operations	• Translating organisational vision into innovation requirements and day-to-day activities (Andersson et al. 2012; Ortega et al. 2014; Elmquist & Segrestin 2009; Joore 2008; Arnold & Hockerts 2011)
	• Aligning business strategies with impact vision and translated in day-to-day activities of employees in the firm	• resources necessary for sustainable development (Halme & Korpela 2014)

Reflexiveness

Reflexive innovators engage in several elements that need to be managed when engaging in innovation. They evaluate whether current and previous actions support the governance of the innovation process and help to achieve desired outcomes of the innovation (e.g. Chalmers & Balan-Vnuk (2013)). The evaluation of the innovation needs to be in line with the type of innovation, what element is looked at, and the purpose of the innovation (Acs & Sany 2009; Berker 2010; Chalmers & Balan-Vnuk 2013; Joore 2008), for example to prevent illusory validation (Ortega et al. 2014). Innovators face the risk that they look at the wrong metrics when evaluating if the innovation has the desired implications. They tend to take for granted that they do-good, without looking for further improvement. For example, target beneficiaries can express gratitude, while the innovator should also look at how grateful beneficiaries are and how the innovation can be improved. Also being in receipt of grants, fellowships or donations does not guarantee that the innovation is actually having the desired impact (Ortega et al. 2014).

Reflexivity can take place in the form of formal evaluations (e.g. whether the performance is in line with the objectives that are set) (e.g. Chalmers & Balan-Vnuk (2013), Spena & Chiara (2012) or Asante et al. (2014)) and can also be achieved by encouraging a self-reflective ethos in the firm (Chalmers & Balan-Vnuk 2013). Some articles reported innovation activities that help innovators to reflect on their responsibility to society. This can be done by discussing and articulating the reason of existence of the firm (and the responsibilities that come with that) or having internal discussions among employees to increase awareness of the influence that their company has on society (Dossa & Kaeufer 2014; von Weltzien Hoivik 2011). There are also examples of innovators who reflect on their role responsibilities (as opposed to wider moral responsibilities) (Halila & Rundquist 2011; Joore 2008).

Innovators can think about the effect of one's own values and motivations on innovation governance and outcomes. Values and motivations are used as heuristics when decisions have to be made under uncertainty or when faced with conflicting options (Larson 2000). That is why it is worrying that drivers such as profit or legislation are still the primary motivations when innovating for sustainability (Biondi et al. 2002; Bocken et al. 2014; Bocken et al. 2013; Doran 2012; Kesidou & Demirel 2012; Osch & Avital 2010). Personal ethics appear to be critical for achieving truly sustainable or social innovations when they are compatible with business sensibilities (Parry 2012; Bocken et al. 2014; Bos-Brouwers 2010). This is especially true of the personal ethics of the owner/manager as their values and motivations affect leadership, organisational culture and ultimately the management of the innovation project. Innovators need to be aware that stakeholders can have different values and motivations, as this affects the development of the innovation (e.g. Bocken et al. (2013)). However, there are still opportunities for innovation when values are conflicting. In those cases, it can be worthwhile to look for compatibility among the values held by different stakeholders instead of aiming for shared values (Harrisson et al. 2012; Kanter 1999).

Innovators can think about the presence, absence and subjectivity of information, the knowledge and abilities they possess, the perceived realities, and their subsequent effect on innovation management. Open communication flows are important to become aware of the subjectivity of knowledge and to reconcile different conceptions of reality (e.g. Chalmers & Balan-Vnuk (2013)). Also activities that encourage reframing of problems and/or solutions, or that encourage involved stakeholders to challenge their own and the firm's approaches, can help the firm to reflect on their thoughts and practices (Elmquist & Segrestin 2009; Lampikoski et al. 2014). This is important, since the present knowledge, experiences and routines affect how problems are understood and subsequently affect the search for solutions (Bocken et al. 2014). It is also important to scrutinize whether the information is complete, objective or accurate (Elmquist & Segrestin 2009; Baba & Walsh 2010). The reported innovation practices and processes were primarily responding to more (practical) knowledge-related problems around innovation, while there were fewer activities mentioned that responded to moral dilemmas, responsibilities and ethical issues.

Therefore, reflexivity can be defined as: critically thinking about one's own actions and responsibilities (1), values and motivations (2) knowledge and perceived realities (3), and how each of these have an effect on the management of the innovation process for the desired outcome.

Table 4. *Operationalisation of the dimension reflexiveness*

Key activities	Strategies	Examples of reviewed papers where key activities and indicators are described
1. *Actions & responsibilities*	• Making sure that there are formal evaluations, third party critical appraisal or an informal (self-) assessment culture	• Actions & responsibilities (Armstrong et al. 2012; Joore 2008; Wilson et al. 2014; Andersson et al. 2012)
	• Creating a culture where there is empowerment of employees	• Empowerment (Harrisson et al. 2012; Chalmers & Balan-Vnuk 2013)
	• Becoming aware of the function and power of the firm in society, and the responsibility that comes with that	• Reflection on responsibilities (von Weltzien Hoivik 2011; Dossa & Kaeufer 2014)
2. *Values & motivations*	• Prioritization of values & motivations	• Prioritization & conflicts (Bocken et al. 2013; Harrisson et al. 2012)
	• Thinking of its effect on innovation governance and outcome(s)	• Effect of values & motivations on innovation governance (Bocken et al. 2014; Ayuso et al. 2006)
	• Determining how to deal with incompatible values and/or motivations	• Business values & innovation governance (Dossa & Kaeufer 2014; Harrisson et al. 2012; Kanter 1999)
3. *Knowledge & perceived realities*	• Scrutinizing the presence, absence and subjectivity of information	• Reflecting on and reframing perceived realities (Lettice & Parekh 2010; Lampikoski et al. 2014)
	• Assessment of the knowledge and abilities present in the firm	• KCP-process (Elmquist & Segrestin 2009)
	• Becoming aware of different perceived realities between actors	• Reconciling different information and realities (Chalmers & Balan-Vnuk 2013; Pujari 2006) encouraging diversity management for innovation (Bridgstock et al. 2010)
	• Reframing of problems and solutions	• KCP-process (Elmquist & Segrestin 2009);

Inclusion

Inclusion can be considered as stakeholder engagement, where innovators determine who to involve, how to involve and during which stages of the innovation process. The goals of innovation networks are more likely to be achieved when a diversity of stakeholders share similar values (Dossa & Kaeufer 2014) or when stakeholders are willing to look for compatible values for the overall goal to be achieved (Harrisson et al. 2012). Managing the network is best achieved when it is comprised of actors who together have the organisational, relational and technical capabilities to bring the innovation to a good end (Harrisson et al. 2012). There were few articles that reported organisations who engaged with the general public (e.g. Edwards-Schachter et al. (2012) or Harrisson et al. (2012)). Instead, articles were reporting activities indicating that innovators are primarily engaging with customers and end-users in order to be responsive to their needs (Ayuso et al. 2006; Blok et al. 2015; Asante et al. 2014). Other stakeholders who are often mentioned are: partners in the supply chain and external knowledge institutes (e.g. universities or research centres). Stakeholders are often involved to resolve knowledge-related problems that come with innovations, which is done by developing the knowledge together or obtaining knowledge from them. For example, collaborating with industry experts in recycling plastics to develop a sustainable product (Larson 2000). However, stakeholders were not involved to help innovators with moral dilemmas or to resolve questions around ethics.

The aim is to achieve and maintain high levels of commitment and involvement by stakeholders (Le Ber & Branzei 2009) which is more likely when information is shared between the firm and its stakeholders. Additionally, the distribution of value between stakeholders, the process of determining this distribution of value, and the extent to which stakeholders can identify with the firm leading the innovation, affect the eagerness to participate in the network (Franke et al. 2013). However, sharing information and maintaining relationships can also be considered as costs for the leading firm. On the one hand, more open innovation processes, where innovation is accelerated by the management of inflows and outflows of knowledge (e.g. idea competitions, collaborative R&D, etc.) can lead to improvement of innovation performance. But on the other hand, it can also have negative effects on competitiveness of the firm (Spena & Chiara 2012; Stuermer et al. 2009; Wagner 2009). Therefore, instead of sharing all information and being fully transparent, organisations engage in selective openness, with limitations on what information to share, at what point in time and to whom (Balka et al. 2014). Another difficulty is the balance between engaging with stakeholders and fostering deliberation while at the same time aiming to maintain the primary power during the innovation process. How this is managed optimally is context dependent, and therefore determined on a case-by-case basis. Balancing costs and benefits of such innovation processes is a learning activity for the firm as it seems hard to manage this successfully.

Inclusion can therefore be defined as: the involvement of a diversity of stakeholders during different stages of the innovation process (1) who comprise a quality innovation network providing different resources necessary for responsible governance of the innovation process and the achievement of the desired outcomes (2). Raising commitment and contribution by multiple stakeholders will benefit network

performance and can be achieved by creating and maintaining relationships that satisfy stakeholders (3).

Table 5. *Operationalisation of the dimension inclusion*

Key activities	Strategies	Examples of reviewed papers where key activities and indicators are described
	Consult, integrate or collaborate with the:	
1. *Involvement of stakeholders in different stages (who & when)*	• Wider public	• Living-lab inclusion (Edwards-Schachter et al. 2012), Community involvement (Bartlett 2009; Ciasullo & Troisi 2013; Ornetzeder 2001) or Focus group with wider public (Dossa & Kaeufer 2014)
	• Supply-chain actors	• Alliance formation and responsible supply-chain development (Chadha 2011; Spena & Chiara 2012)
	• End-users	• formal role end-user in company & crowdsourcing (Ayuso et al. 2006; Franke et al. 2013)
	• NGOs	• Innovation system with NGOs (Harrisson et al. 2012), Creating more impact with NGOs (Kanter 1999) or Social alliance innovation (Jamali et al. 2011)
	• Experts	• Expert involvement for epistemic problems (Baba & Walsh 2010), External research and evaluation (Harrisson et al. 2012), Support of experts for in-depth anticipation (Walter & Scholz 2006; Joore 2008) or Inclusion for technological problems (Halila & Rundquist 2011)
	• Multiple/non-specified	• (Multi-)Stakeholder involvement activities (Chalmers & Balan-Vnuk 2013; Spena & Chiara 2012; Bridgstock et al. 2010; Lopez-Berzosa & Gawer 2014)
	• Governmental	• Role of private firms versus government (Carrillo-Hermosilla et al. 2010)

Table 5. *(continued)*

Key activities	Strategies	Examples of reviewed papers where key activities and indicators are described
2. *Provision of resources and capital (how)*	• Consultancy (e.g. Scientific support or Governmental support)	• Bridging and bonding with experts (Harrisson et al. 2012; Baba & Walsh 2010; Parry 2012)
	• User-innovation (e.g. Crowdsourcing, Focus groups or Bottom-up innovation	• Official role in firm for users & focus group with wider public (Ayuso et al. 2006; Dossa & Kaeufer 2014), Crowdsourcing (Füller et al. 2012; Franke et al. 2013; Balka et al. 2014) or User-driven innovation (Ornetzeder 2001)
	• Community visits	Community visiting (Bartlett 2009) or using social organisations as gatekeepers between firm and society (Kanter 1999; Jamali et al. 2011)
	• Indirect representatives (e.g. thought experiments, Role playing or via intermediaries	• Representation of stakeholders for anticipation (Andersson et al. 2012; Bocken et al. 2013) or Intermediaries support in innovation processes (Hansen et al. 2011)
	• (Public) Platform for expressing needs and concerns	• Living lab (Edwards-Schachter et al. 2012)
3. *Raised commitment and contribution (how)*	• Balancing transparency and openness in relationships and the innovation process and receiving inputs by external actors	• Examples of cost-benefit struggles (Spena & Chiara 2012; Wagner 2009; Stuermer et al. 2009)
	• Fair relationship regarding the tasks and returns for stakeholder input	• Creating crowdsourcing satisfaction (Franke et al. 2013; Füller et al. 2012)
	• Role recalibrations as roles change over time and need to be re-adjusted	• Maintaining workable stakeholder relationships over time (Le Ber & Branzei 2009)

Table 5. *(continued)*

Key activities	**Strategies**	**Examples of reviewed papers where key activities and indicators are described**
Raised commitment and contribution (how)	• Working with actors sharing same values	• Creating positive ethical networks (Dossa & Kaeufer 2014)
(continued)	• Working with actors with different (sometimes opposing) values	• Strategies to reconcile opposing views (Harrisson et al. 2012) or bridging opposing values and new values creation (Le Ber & Branzei 2009)

Deliberation

Multiple studies indicate that companies are engaged in a dialogue with different stakeholders (Ayuso et al. 2006). This is done in different ways, such as crowdsourcing (Franke et al. 2013; Hansen et al. 2011), focus group discussions (Dossa & Kaeufer 2014), workshop settings (Rohrbeck et al. 2013; Haen et al. 2015) community visits (Chadha 2011; Bartlett 2009; Ornetzeder 2001) or deliberation with experts in the field (Baba & Walsh 2010).

There are several conditions mentioned in the literature that can improve stakeholder dialogues. Namely, that they are (ideally) based on accurate and transparent information (Ayuso et al. 2006; Franke et al. 2013), constructively work toward common interests (Bocken et al. 2013), show respectfulness to contributors, and are based on trust and credibility between contributors (Harrisson et al. 2012; Ciasullo & Troisi 2013). The exchange of views and opinions was requested in order to evaluate and give meaning to shared information and knowledge; but also to determine the criteria for evaluation (Harrisson et al. 2012; Rohrbeck et al. 2013; Edwards-Schachter et al. 2012) that can be different among stakeholders (e.g. Hansen et al. (2011)). Articulating or visualising (Steen et al. 2014; Ornetzeder 2001) the development of the innovation and the expected outcomes can help to increase understanding among stakeholders.

Deliberation takes place in many cases with customers and end-users (Ayuso et al. 2006; Chadha 2011; Ciasullo & Troisi 2013; Asante et al. 2014), but also (professional) communities (Edwards-Schachter et al. 2012; Chalmers & Balan-Vnuk 2013; Harrisson et al. 2012; Kanter 1999). Deliberation with the (potential) customers or end-users can help organisations to better understand their needs and how the innovation can be responsive to those needs (Ayuso et al. 2006; Chadha 2011; Berker 2010; Andersson et al. 2012). However, it is also important to deliberate with stakeholders who can contribute to the actual development of the innovation. In these cases, deliberation also serves to enhance understanding about the actions and commitments of each stakeholder for the development of the innovation (Haen et al. 2015), and how their interests can be aligned with the overall objective of the collaboration (Blok et al. 2015; Bartlett 2009; Jamali et al. 2011).

There are several ways that enable involved stakeholders to influence the decision-making process. Indirectly by providing their non-binding view or opinion about the decision to be made (Dossa & Kaeufer 2014), directly by means of voting (Franke et al. 2013; Hansen et al. 2011), or in exceptional cases by having

a place in the organisational structure of the firm (Ayuso et al. 2006). For actors to be satisfied regarding the deliberation, innovators share what the outcomes of the deliberation are, how contributors' opinions are translated into innovations, or why that was not the case (Franke et al. 2013).

Therefore, deliberation can be defined as a: commonly agreed two-way exchange of views and opinions between stakeholders (1) based on shared information and evaluation criteria (2) that could support decision-making with regard to the innovation that is under consideration (3). This can be complemented with actual decision-making power of stakeholders regarding the innovation process and/or outcomes (4). Satisfying contributors is achieved by providing feedback regarding the dialogue and explaining how the results are integrated into the innovation (5), which can facilitate innovation adoption.

Table 6. *Operationalisation of the dimension deliberation.*

Key activities	Strategies	Examples of reviewed papers where key activities and indicators are described
1. *Two-way exchange of views and opinions*	• Formalised process how deliberation can be governed	• Formal procedures for deliberating with stakeholders (Andersson et al. 2012; Armstrong et al. 2012; Harrisson et al. 2012)
	• Enabling active systems of dialogue (e.g. Discussions & focus groups or Participation in societal debate	• Active communication activities with stakeholders (Bocken et al. 2013; Dossa & Kaeufer 2014; Bos-Brouwers 2010; Andersson et al. 2012; Chadha 2011)
2. *Shared information and value criteria*	• Provision of accurate and transparent information	• Providing the right information (Ayuso et al. 2006; Chadha 2011; Harrisson et al. 2012; Limburg 2014)
	• Evaluation of shared information (determined beforehand or along the way)	• Examples of how to act upon shared information (Baba & Walsh 2010; Edwards-Schachter et al. 2012; Elmquist & Segrestin 2009; Harrisson et al. 2012; Chalmers & Balan-Vnuk 2013; Hansen et al. 2011)

Table 6. *(continued)*

Key activities	Strategies	Examples of reviewed papers where key activities and indicators are described
3. *Support decision-making with regard to the innovation that is under consideration*	• Equal consideration of stakeholder interests	• Examples of how to equally consider stakeholder interests (Bocken et al. 2013; Harrisson et al. 2012)
	• Wider group of stakeholder consultation to decide	• Living lab (Edwards-Schachter et al. 2012) and stakeholder mapping for consultation (von Weltzien Hoivik 2011)
4. *Decision-making power of stakeholders regarding the innovation process and/or outcome*	• Providing a place in the board of the firm	• Giving consumers an official role in organisational structure (Ayuso et al. 2006)
	• Providing voting power in the process and regarding the outcomes	• Allocating decision-making power (Ayuso et al. 2006; Edwards-Schachter et al. 2012; Franke et al. 2013)
	• Providing a platform to express their voice regarding the process and outcomes	• Opportunities to express the needs and wants, etc. (Harrisson et al. 2012; Bocken et al. 2013; Chalmers & Balan-Vnuk 2013; Dossa & Kaeufer 2014)
5. *Feedback regarding the dialogue and explain how the results are integrated in the innovation*	• Providing feedback what is done (or not) with the input of stakeholders	• Providing appropriate feedback regarding deliberation (Ayuso et al. 2006; Jamali et al. 2011)
	• Transparent process how ideas are selected and integrated	• Pre-determined transparent process of integrating information (Franke et al. 2013; Harrisson et al. 2012)

Responsiveness

Companies need to make sure that they are aware of new information about the external environment that would require adjustment of the innovation. Also new information about the innovation itself could urge innovators to make adjustments. Furthermore, companies need to be able to respond to these changes and

new information during and after innovating. In the end, they need to actually adjust the innovation in order to be responsive.

Companies aim to monitor the circumstances in which the innovation is implemented, including after the innovation is launched onto the market. However, deliberation with the aim of understanding the problem addressed or the changing stakeholder needs does not necessarily mean that the innovator is willing, or able, to take responsibility for addressing them with the innovation (Armstrong et al. 2012). It is important that companies do not experience organisational inertia, bureaucracy, or other factors like resistance to change (Bartlett 2009) or a lack of resources (Chalmers & Balan-Vnuk 2013), which can hinder efficient and effective responsivity (Bos-Brouwers 2010; Elmquist & Segrestin 2009). Furthermore, especially small firms, can experience a lack of resources to adequately respond to reasons for adjusting the innovation. Companies can respond to changes in the external environment by developing responsive innovation strategies (Acs & Sany 2009; Berker 2010; Blum-Kusterer & Hussain 2001; Bartlett 2009). An example of this is mainstreaming, which is similar to tailoring the product for local needs (Berker 2010). It is clear that more open and adaptive innovation processes are more flexible in being tailored to different local contexts (Berker 2010; Kinder 2010).

Some companies argue that since one cannot fully anticipate all risks and uncertainties, it is better to develop and launch the innovation and to then make subsequent effective adjustments afterwards (learning-whilst-doing) (Kinder 2010; Ortega et al. 2014). This enables them to be responsive to feedback from the external environment or to new insights regarding the innovation's impacts (Kinder 2010; Ortega et al. 2014). The changing circumstances to which the company responds can originate from within the firm but also from their external environment (Parry 2012). When it is not possible to safeguard the society from detrimental impacts, or the innovation is not ethically acceptable, societally and/or environmentally desirable, the decision needs to be made as to whether the innovation should be launched into the market or taken off the market (Weisenfeld 2012; Baba & Walsh 2010; Wodzisz 2015).

Companies can also benefit from collaboration with other firms or stakeholders, for example to keep up with information flows, changes in the innovation system, and to be able to respond to them (Biondi et al. 2002; Bos-Brouwers 2010; Chalmers & Balan-Vnuk 2013; Kiron et al. 2013). In some cases it can be necessary to refine the business model to be successfully responsive to changes in the external environment (Richter 2013; Kiron et al. 2013). When developing an innovation with different stakeholders, it is important that there is clarity about the roles and responsibilities of those stakeholders (Jamali et al. 2011; Joore 2008). Stakeholders can be mutually responsive to each other if they recalibrate the roles they play during the innovation process (Le Ber & Branzei 2009). Successful innovations are developed with stakeholders who are willing to readjust their roles during the innovation process, and are open to learn as new information becomes available or known (Ortega et al. 2014; Le Ber & Branzei 2009; Jamali et al. 2011). This is more likely to be achieved when stakeholders can identify themselves with the common objective (Le Ber & Branzei 2009) and invest in the innovation by bringing in resources (Jamali et al. 2011; Kanter 1999).

Therefore, responsiveness can be defined as: making sure that the organisation is able to, and actually does, adjust the innovation process in accordance with events and changing circumstances that take place during the innovation process (1) within and outside the organisation (2), in order to safeguard the achievement of the desired innovation outcomes which address grand challenges and/or prevent detrimental effects (3). This can imply that the innovation project will be adjusted or even withdrawn from market launch. Stakeholders can be mutually responsive to each other by recalibrating their roles and responsibilities during the innovation process (4).

Table 7. *Operationalisation of the dimension responsiveness.*

Key activities	Strategies	Examples of reviewed papers where key activities and indicators are described
1. *Making sure that one can respond to changes in the environment*	• Mainstreaming/customizing to satisfy stakeholder needs	• customisation activities (Berker 2010; Evans et al. 2007)
	• Prevent or overcome organisational inertia (e.g. little bureaucracy, creativity trainings or enhancing (in)formal communication	• autonomous thinking time (Chalmers & Balan-Vnuk 2013), organisational culture for creativity & innovation (Riivari & Lämsä 2013; Ruppel & Harrington 2000) or KCP process of reframing problems (Elmquist & Segrestin 2009)
	• Collaboration for fast & effective response	• absorptive capacity routines combining user and technical knowledge (Chalmers & Balan-Vnuk 2013)
2. *Actual response to changing environments*	• Defining nature, pace and impact based on interaction with the innovation system	• negotiation through institutional & structural layers (Acs & Sany 2009; Berker 2010) or determining pace of innovation based on capabilities (Arnold 2010)
	• Reinvent (innovation & organisation) to align with newly recognized needs	• change organisational routines (Bartlett 2009; Lettice & Parekh 2010; Kiron et al. 2013) or responding to rules & regulations and technology developments (Blum-Kusterer & Hussain 2001)
	• Changing the environment (e.g. institutional barriers or social epistemologies)	• substitution strategies (Berker 2010) or knowledge creation to affect social epistemologies (Baba & Walsh 2010)

Table 7. *(continued)*

Key activities	**Strategies**	**Examples of reviewed papers where key activities and indicators are described**
3. *Addresses grand challenges*	• Responding to social issues	• examples of articles looking into social aspects of innovations (Jamali et al. 2011; Edwards-Schachter et al. 2012; Acs & Sany 2009; Bartlett 2009)
	• Responding to environmental issues	• examples looking at responding to environmental challenges and integrating environmental goals in innovation (Arnold 2010; Larson 2000; Carrillo-Hermosilla et al. 2010; Bocken et al. 2014; Wodzisz 2015; Weisenfeld 2012)
	• Economic issues	• responding to poverty (Acs & Sany 2009) or responsible financial products (Asante et al. 2014)
	• Preventing detrimental effects	• consideration of withdrawing innovation from the market (Weisenfeld 2012; Baba & Walsh 2010)
4. *Mutual responsiveness*	• Align stakeholder interests with the overall innovation objective	• Aligning stakeholders' strategic interests with the overall goal of the innovation (Blok et al. 2015; Jamali et al. 2011; Harrisson et al. 2012; Kanter 1999)
	• Investment of resources by involved stakeholders	• Partners bringing in resources for successful development of innovation (Le Ber & Branzei 2009; Jamali et al. 2011; Kanter 1999)

Table 7. *(continued)*

Key activities	**Strategies**	**Examples of reviewed papers where key activities and indicators are described**
Mutual responsiveness *(continued)*	• Willingness to recalibrate the roles and responsibilities for sustaining stakeholder relationships	• (Re)forming strategic cross-sector partnerships (Le Ber & Branzei 2009)

Knowledge management

The dimension of knowledge management is a recurring theme observed after inductive analysis of the articles. Firms can lack knowledge that is necessary for developing an innovation that is responsive to stakeholder needs. Therefore, they engage in different activities to obtain the necessary knowledge. These activities are coded based on the typologies of knowledge-based dynamic capabilities developed by Denford (Denford 2013).

The main approaches to obtain the necessary knowledge is by creating the knowledge within the firm (e.g. by experimenting) and integration of present knowledge throughout other parts of the firm. However, there are also activities that lead to the development of the necessary knowledge with actors or organisations beyond the firm, obtaining the knowledge from them, and/or synthesising knowledge.

Firms aim to solve the knowledge gaps by themselves, obtaining the missing knowledge without the involvement of external actors. For example, by engaging in knowledge creation, which takes place within the firm and is focused more on exploration of new knowledge. Examples of this are: different units in the firm which learn from each other, or by engaging in experimenting, or other ways of creating, searching for, and combining intra-firm knowledge (Bocken et al. 2014; Steen et al. 2014). This requires a culture of innovation, learning-by-doing, experimentation and Research and Development (R&D) (Doran 2012). Firms also engage in knowledge integration, which is about generating new innovations with already present knowledge, resulting from internal knowledge transfer between departments and multidisciplinary groups for innovation (Arnold 2010; Ayuso et al. 2006; Bocken et al. 2014; Chadha 2011; Chalmers & Balan-Vnuk 2013; Kinder 2010). For example, this can be achieved by having internal platforms and networks within (especially large) firms that enable the flow of knowledge between departments (Arnold & Hockerts 2011; Ayuso et al. 2006).

Firms also aim to solve knowledge gaps by developing missing knowledge with other firms, or absorbing the knowledge of other firms. Firms engage in knowledge development with other actors, where together they obtain new knowledge (Baba & Walsh 2010; Chadha 2011; Ciasullo & Troisi 2013; Larson 2000; Rohrbeck et al. 2013), for example by joint R&D agreements (Chadha 2011; Halme & Korpela 2013). Firms can also absorb external knowledge to bring it within their own firm, for example by bringing in extant knowledge by partnerships, or communicating with stakeholders who have creative and/or practical

knowledge (Ayuso et al. 2006; Bartlett 2009; Bocken et al. 2014; Chadha 2011; Elmquist & Segrestin 2009; Halila & Rundquist 2011; Stuermer et al. 2009; Scholten & van der Duin 2015). Firms engaging in knowledge synthesis can also develop better innovations when combining external knowledge and exploiting this by combining it with knowledge already present within the firm (Ayuso et al. 2006). Examples of this are: collaboration partnerships and information exchange between firms and external actors (Arnold & Hockerts 2011; Baba & Walsh 2010; Chalmers & Balan-Vnuk 2013; Ciasullo & Troisi 2013; Kanter 1999; Walter & Scholz 2006; Scholten & van der Duin 2015)

Therefore, knowledge management can be defined as: creating or obtaining knowledge to solve knowledge gaps that come with the processes and outcomes of the innovation (1) to subsequently integrate it into the innovation process (2).

Table 8. *Operationalisation of the dimension knowledge management.*

Key activities	Strategies	Examples of reviewed papers where key activities and indicators are described
1. *Knowledge creation and integration*	• Intra-organisational training	• Developing skills for innovating (Arnold & Hockerts 2011; Ciasullo & Troisi 2013; Ketata et al. 2014)
	• Firm-internal platforms for knowledge exchange	• Within firm distribution of knowledge (Arnold & Hockerts 2011)
	• Experimenting and R&D	• Creating a culture for knowledge creation (Doran 2012; Kinder 2010; Lampikoski et al. 2014; Ortega et al. 2014; Steen et al. 2014)
	• Brainstorming & ideation	• Exploration of new opportunities for innovation (Bocken et al. 2014; Lampikoski et al. 2014)
	• Non-hierarchical structures and/or direct communication (channels)	• Organisational structure and culture for sharing & integrating knowledge (Ayuso et al. 2006; Chalmers & Balan-Vnuk 2013)

Table 8. (continued)

Key activities	Strategies	Examples of reviewed papers where key activities and indicators are described
2. Knowledge developing, assimilating and synthesising	• Collaboration partnerships (e.g. R&D consortia)	• Examples of organisations who work in a network to respond to challenges (Arnold & Hockerts 2011; Chadha 2011; Ciasullo & Troisi 2013; Jamali et al. 2011; Larson 2000; Stuermer et al. 2009)
	• Create a culture and platforms for knowledge exchange	• Examples of collaborating for knowledge exchange (Arnold & Hockerts 2011; Ayuso et al. 2006; Ciasullo & Troisi 2013; Edwards-Schachter et al. 2012; Ketata et al. 2014; Ziv 2008; Lampikoski et al. 2014)
	• Appoint a (team of) employee(s) responsible for gathering and integrating knowledge	• Specific job responsibilities for knowledge integration (Ayuso et al. 2006; Bartlett 2009; Chadha 2011; Walter & Scholz 2006)
	• Autonomous thinking time	• Giving employees the freedom to experiment themselves and explore for outside knowledge (Bocken et al. 2014; Chalmers & Balan-Vnuk 2013)

3.5. Discussion

The aim of this review is to explore how companies can engage in responsible innovation practices. The focus was to review practices that can constitute day-to-day responsible innovation activities of companies who want to develop innovations that respond to grand societal challenges. However, there are a few limitations that need to be taken into account when interpreting the results of this review. First, research on responsible innovation and the initial framework of responsible innovation proposed by Stilgoe et al. (2013) are predominantly influenced by a European discourse. However, responsible innovation should *"not seek to impose an a priori framework"* for contexts beyond the European one (Macnaghten et al. 2014, p.197). Therefore, we stress that any responsible innovation framework should be critically assessed before being implemented in a particular innovation context, especially for innovation contexts beyond the European

borders. Second, the refined framework of responsible innovation that we propose in this review can be seen as a bricolage of innovation activities coming from responsible-, social- and sustainable innovation articles. Even though, social- and sustainable innovation are similar to responsible innovation, differences can be found (Lubberink et al. 2017a). Therefore, further research is needed to test how these dimensions can all be applied together in a business context, since there are also most certainly interaction effects between the dimensions. Third, this review investigated what innovation activities are already implemented in business contexts that indicate implementation of the dimensions of responsible innovation. This means that the initial architecture of responsible innovation that served as a specific lens for the review is likely to be different from the research lens of the scientists of the reviewed articles. We can therefore not rule out that there were non-reported findings beyond the scope of their articles, which could have been of interest for this particular review. Since a systematic literature review is time consuming, there is an inherent timespan between the search for literature, appraisal of the literature, and publication of the review. As a coping strategy, we conducted a non-systematic literature search to identify and discuss the most recent empirical investigations of responsible innovation in business contexts. Literature reviews of responsible innovation (Burget et al. 2017; Ribeiro et al. 2016) were consulted, a non-systematic search in search engines and several reports of European projects investigating responsible innovation.

Again, we found that there are few scholars who empirically investigated responsible innovation practices and processes in commercial R&D settings. With regard to enhancing anticipation, Arentshorst, Broerse, Roelofsen, & de Cock Buning (2014) state that scientists and technology developers should not only engage in constructive technology assessment but also in vision assessment that aims to make the driving forces behind expectations, promises and guiding visions explicit and assessed on their realistic value. With regard to enhancing reflexivity, Flipse, van der Sanden, & Osseweijer (2013) propose that researchers with industrial motivations get in contact with humanists during the early stages of innovation to increase researchers' awareness of social and ethical considerations in their work. Foley, Bernstein, & Wiek (2016) propose a new refined framework for responsible innovation that builds on the procedural dimensions of Stilgoe et al. and the substantive approach by von Schomberg, including the idea of intra- and inter-generational justice. When applied in a case study, they found that their framework is particularly helpful for assessing stakeholders' perceptions regarding responsibilities for innovation. Also corporate responsibility tools (e.g. ISO or EMAS standards) are proposed to aid implementation of multiple responsible innovation dimensions, which can help to meet the normative anchor-points that ensue from the European Treaty (Iatridis & Schroeder 2016).

There have been several reports published that resulted from research projects on responsible innovation commissioned by the European Union. For instance, the Res-AGorA project, in which a 'responsibility navigator' is developed (Res-AGorA 2016) that functions as a thinking tool to enhance reflexive processes with the inclusion of stakeholders and policy makers to make research and innovation more responsible, responsive, and sustainable. They propose ten governance principles and requirements to make responsibility an institutionalised ambition within research and innovation. Another project is RRI-Tools (Schrammel et al. 2016), where an online tool is co-constructed to make a wide variety of stakeholders

familiar with responsible innovation (e.g. research communities, R&D intensive businesses and citizens). It includes for example a self-reflection tool to self-assess one's responsible innovation practices, stimulates learning for more responsible innovation practices, and suggests trainings and further communication. The project Responsible Industry proposes a framework (Porcari et al. 2015) that consists of strategic options and recommendations for more responsible practices and behaviours, which aims to inform CEOs, senior executives and project managers. It addresses questions regarding the roles and responsibilities for implementing responsible innovation in the firm. It also provides methods on how responsible innovation can be integrated along the value chain or how organisations can perform ethical and social impact analyses, among other things.

Our systematic review of the empirical literature reaffirmed that documentation of responsible innovation in a business context is still scarce. Therefore, articles investigating social- and sustainable innovation in business contexts are included as well. The research in these three related fields are widely distributed and focused on empirical exploratory and descriptive research. Furthermore, systematic literature reviews for each of these concepts state that consensus on the definition and conceptualisation of the concepts is lacking. Supported by the fact that most of the included studies are published after 2010, we argue that research in this field in general, and responsible innovation in particular, are primarily in the phase of theory-building. This study aims to not only focus on theory-building, but also to provide practical substance to the initial framework introduced by Stilgoe et al. to inform practitioners who would like to engage in responsible innovation.

3.6. Conclusion

In order to move the field of responsible innovation forward, it is important to investigate how *de facto* responsible innovation can be successfully implemented in the private sector in the current political and socio-economic system. We therefore reviewed effective innovation activities that could help to achieve implementation of the dimensions of responsible innovation in a business context. This review builds on an existing, and gradually increasing, stream of research on responsible innovation. It can be seen as a first effort to support operationalising of responsible innovation in a business context based on insights from a systematic review of approaches from aligned concepts relating to social and sustainable innovation. The results of this systematic literature review can therefore inform future research to assess to what extent companies implemented responsible innovation dimensions during innovation.

The literature on responsible innovation suggests that anticipation involves systems-thinking about the implications of the innovation, including the dynamic interrelationships between the innovation and the system in which it is developed and implemented. While Stilgoe et al. proposes to focus on the underlying purposes of the innovation and discussing desirable implications with stakeholders, there are also voices arguing that negative implications need to be explicitly taken into account. Based on the review of the included articles, we argue that companies are already engaging in systems thinking for innovation. Furthermore, companies are engaged in understanding the needs of the target beneficiary (often the

consumer) and discussing with stakeholders how their innovation can be responsive to their needs. However, innovation activities that critically examine which desirable implications are missed by the innovation, or whether it actually has negative implications (Bocken et al. 2013) were scarce. Therefore, the following research questions for further research are proposed:

- How can innovators in business contexts be encouraged so that they are more inclined to foresee possible detrimental implications of the innovations they intend to develop?

- What tools, activities or strategies can be used to help organisations to foresee possible detrimental implications, without holding back potentially desirable innovations?

The literature on responsible innovation suggests that reflexivity is about holding up a mirror to one's own activities, commitments and assumptions. It aims to increase awareness about the limits of knowledge and that one's perceived reality might not be universally held. Additionally, it is important to engage in second-order reflexivity where one thinks about how one's underlying values systems and beliefs influence the development of the innovation. And what the role of the organisation and its innovation are in the wider political and socio-economic system. In the end, innovators should not only live up to their role responsibility but also their wider moral responsibilities (Stilgoe et al. 2013; Pavie et al. 2014). The review of the included articles revealed that organisations engage in several activities to reflect on one's own actions, commitments and assumptions. Furthermore, companies are aware of their knowledge gaps and how to address them. While companies do monitor and evaluate their innovations, there is limited evidence that they engage in second-order reflexivity (e.g. Asante et al. (2014)). This is an important observation given that their value systems have major implications for the development of the innovation and its future impact (e.g. Acs & Sany (2009) or Bos-Brouwers (2010)). Therefore, the following research question for further research is proposed:

- How can second-order reflexivity be instilled in innovative organisations in business contexts (i.e. reflecting how the underlying value systems and beliefs affect the development and implementation of the innovation)?

The literature on responsible innovation suggests that Inclusion and Deliberation are about upstream engagement of stakeholders and the wider public to open up discussions and to interrogate the social, political and ethical implications that the development of the innovation would bring (Stilgoe et al. 2013). It involves an *"active engagement of stakeholders for the purpose of substantively better decision-making and mutual learning"* (Wickson & Carew 2014, p.2). Furthermore, stakeholder inclusion and stakeholder deliberation are used interchangeably in responsible innovation literature.

The findings from the review indicate that stakeholder inclusion was one of the most encountered dimensions of responsible innovation in the reviewed articles. This revolves predominantly around stakeholders such as clients and end-users, and people or organisations with professional expertise. However, inclusion of the wider public was less encountered, which is unfortunate as the latter can challenge the professional identity of actors engaged in innovation. This is important as it cannot only urge innovators to reflect on what 'innovation excellence' is, but also on macro questions considering the role they and their

innovation play in the political and socio-economic system, and the responsibility that comes with that (Pandza & Ellwood 2013; Asante et al. 2014).

Supported with the findings from the review of the articles, we still deem it legitimate to differentiate between stakeholder inclusion and stakeholder deliberation. While the two are interrelated, one cannot engage in stakeholder deliberation without inclusion, they involve different activities. Inclusion focuses more on stakeholder engagement (i.e. which stakeholders to involve and when to involve them) whereas deliberation in a business context is about creating the right conditions for an open and honest dialogue, which should result in better decision-making during innovation.

Most of the empirical studies investigating stakeholder inclusion provide evidence that organisations primarily involve stakeholders who share similar values or stakeholders who are motivated to align their interests with a shared objective of the innovation. However, there were only few reported events where stakeholders with conflicting values, or stakeholders who might oppose the innovation, were involved in the innovation. Therefore, the following research questions for further research are proposed:

- How can stakeholders with dissimilar values, or stakeholders who oppose the innovation, be involved during the innovation process?

- Hence, how does the inclusion of these stakeholders influence the development of the innovation and its subsequent implementation?

The included articles provided evidence that organisations aim to deliberate with stakeholders to improve the decisions made during the development of the innovation. While these efforts can be praised, it is also important that companies consider the costs of these activities. For example, they need to consider what they do with the input from stakeholders, and communicate how stakeholder input influenced the innovation. Furthermore, stakeholders are more willing to engage in deliberation when organisations are more transparent. However, this is not always possible during the innovation process. Firms therefore need to learn how to integrate ethics values in innovation (e.g. by deliberating not only with stakeholders but also the wider public) without putting the survival of the firm at risk. If they manage to do so, a next step would be to institutionalise this within the organisation and to make it a new organisational capability (Pandza & Ellwood 2013; Schumacher & Wasieleski 2013). Therefore, the following research question for further research is proposed:

- How can organisations engage in an honest dialogue, based on transparent information accessible to the stakeholders involved, without putting their competitive advantage at risk?

Responsiveness is about having the capacity to change the shape or direction of the innovation in response to values of stakeholders and the wider public. Furthermore, it requires a collective institutionalised response and co-responsibility for responsible development of the innovation (Owen et al. 2013) in light of new knowledge, perspectives, views and norms that emerge during innovating. The review of the included studies indicates that companies think about how to adjust their innovation to align it with (possible) changes in their external environment. Furthermore, we see that companies collaborate especially with partner firms to develop innovations. These firms recalibrate their roles during the innovation to maintain workable relationships. However, when it comes to mutual responsiveness between people from the industry and

other stakeholders, Haen et al. (2015) found out that both are not necessarily willing to take the responsibility for solving a problem, even after deliberation helped them to understand the problem and to find possible solutions. Along the same line, Blok et al. (2015) found out that not only the company but also the stakeholders are unwilling to be co-responsible for the innovation. When it comes to responsiveness, following the findings by Haen et al. (2015) and Blok et al. (2015) in that order, the following questions can be raised:

- How can deliberation with stakeholders lead to higher mutual responsiveness among the involved stakeholders?
- How can stakeholders involved be held (co-)responsible for the final innovation?
- How can stakeholders be convinced to take part of the responsibility for the development of the innovation?

An important dimension was observed after an inductive investigation of the empirical articles. The activities that were often recurring in the findings of the empirical papers indicate the importance of knowledge management when innovating for society and with society. These activities specifically focus on practical knowledge gaps that innovators face with regard to the development and subsequent impact of the innovation. Organisations subsequently created new knowledge in-house and disseminated this throughout their firm, or they looked beyond their walls and involved other organisations to develop knowledge or share knowledge and insights with them. The latter was especially the case with small and medium enterprises, which have fewer resources to invest in R&D to solve the knowledge gaps. Another strategy to deal with this challenge was the monitoring of innovative developments in the external environment. The concept open innovation can be informative for the dimension of knowledge management because it revolves around internal and external knowledge flows to accelerate internal innovation, and how firms can use both internal and external ideas to advance their innovation. Furthermore, there is more documentation at hand regarding open innovation in business contexts as it already received significant attention of the academic community. Therefore, not only social- and sustainable innovation but also open innovation can serve as an interesting avenue for future research on responsible innovation.

This review proposes an adjusted framework to examine the activities for responsible innovation in a business context. The main purpose of this framework is to inform how innovators can engage in activities that enhance anticipation, reflexivity, inclusion & deliberation, responsiveness and knowledge management. Besides intra-firm activities, there are also collaborative activities proposed that can enhance the implementation of each of these dimensions. The collaborative activities correspond more with the democratic governance of innovation that is proposed in responsible innovation literature. This adjusted framework for responsible innovation in a business context builds on previous works in the field of responsible innovation. With evidence coming from a diverse body of literature, it gives practical substance to the initial framework proposed by Stilgoe et al. (2013).

Even though it goes beyond the purpose of this review, we do touch upon the mutual relationship between responsible innovation and the current political and socio-economic system. On the one hand, new

knowledge and technology embeds and enacts value-laden and politically significant judgments of what the world should look like and will look like (Ribeiro et al. 2016). Similar can be said for the concept of responsible innovation because its proponents have a normative-political orientation as they aim to change the governance of science and innovation, and ultimately change the current political and socio-economic system (van Oudheusden 2014). This also holds for alternative approaches to innovation that are currently emerging. For example, there is a growing scientific community in business studies that is investigating social entrepreneurship. Social entrepreneurship and social innovation are anything but value-free, and have politically significant judgments of what the world should look like, and the role that innovation plays in this. Following from responsible innovation, one would suggest that also in these alternative approaches to innovation, stakeholders should be able to negotiate the terms of their inclusion and deliberation, including the politics behind these novel systems, and the substantive biases that can exist. For example, because social entrepreneurs can also have a tendency that their social concerns outweigh ethical concerns (Zahra et al. 2009).

There are also novel approaches when it comes to innovating for sustainability. The circular economy seems to gain a foothold as a new approach that guides the search for innovative solutions for sustainability. Also, social movements for grassroots innovation are emerging, who encourage community-led innovations for sustainability. Whereas proponents of frugal innovation view that the complexity and costs of a product and its production need to be reduced to make it more durable and affordable in developing countries. Then there are also social movements, inspired by anti-consumerism and anti-capitalism, who urge to pursue 'de-growth'. Furthermore, the question can also be raised as to whether to innovate at all. Since each of these approaches to innovation have a view on what the world should look like and the role that innovation plays in this, we argue that upstream inclusion of stakeholders and the wider public, who deliberate about the innovation at stake, can help to steer these innovation processes and outcomes to ultimately achieve more sustainable, societally desirable and ethically acceptable solutions.

The conclusion can be drawn that responsible innovation does not only ask for new corporate practice in terms of innovation activities, but it also demands that companies reflect on their business models, leadership, and their roles and responsibilities for the political and socio-economic system in which they operate. The results of this review can help practitioners in business contexts to engage in more responsible innovation activities, given the current political and socio-economic system. It is also informative for policy makers and scientists interested in responsible innovation as this review serves as a first attempt to move the discussion of 'what responsible innovation means' towards 'how it could be implemented in a business context'.

The Empirical Part

Chapter 4

Innovating For Society: Towards a Typology of Developing Innovations by Social Entrepreneurs[9]

4.1. Introduction

Societies all over the world are facing major societal challenges, such as climate change, socio-economic inequalities or ageing populations. Social entrepreneurs take it on themselves to develop innovative solutions for such societal challenges (Dees 2007), in particular those that governments, for-profit and non-profit organisations fail to address (properly) (Sud et al. 2009). This problem-solving role in society is recognised by governments, who therefore stimulate social entrepreneurship and innovation, especially in times of general retrenchment (Mueller et al. 2015; Shaw & de Bruin 2013). Supporting organisations such as Ashoka and the Skoll foundation have also created platforms for social entrepreneurship to stimulate their problem-solving role in society. Moreover, the academic community has studied this social phenomenon with increasing interest, with the result that the current state of social entrepreneurship research has progressed beyond infancy into a mature stage (Sassmannshausen & Volkmann 2016).

Even though social entrepreneurship research has matured, there are still many gaps in our knowledge. Previous research focused predominantly on defining, conceptualising, and describing the phenomenon of social entrepreneurship (Zahra et al. 2009; Granados et al. 2011; Sassmannshausen & Volkmann 2016). However, even though social entrepreneurs are characterised as innovative individuals (Zahra et al. 2009), the actual innovation process is still an understudied theme in social entrepreneurship (Chalmers & Balan-Vnuk 2013). Exploring how social entrepreneurs manage to develop their innovations is therefore expected to advance the field (Doherty et al. 2014; Phillips et al. 2015). For example, empirical research by Waddock & Steckler (2016) revealed that only half of the social entrepreneurs engage in action guided by a clear vision, which conflicts with the image of social entrepreneurs as visionary change agents. Furthermore, the development of innovation in social enterprises is likely to take place in multi-stakeholder environments that may support or inhibit the success of the innovation (Newth & Woods 2014), even though social entrepreneurs are frequently portrayed as heroic lone entrepreneurs (Dufays & Huybrechts 2014). On the one hand stakeholders may support the innovation process as they can provide new knowledge and insights (Kong 2010) and ultimately legitimacy for the innovation (Newth & Woods 2014);

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on the other hand they may also have different, sometimes opposing, values and opinions regarding the innovation (Cho 2006) and thus be a source of resistance (Newth & Woods 2014). It is therefore vital for social enterprises to be open to their external environment to develop successful innovations, while at the same time making sure that the development process is controlled and efficient, and facilitates better decision-making (Kong 2010). Exploring how social entrepreneurs develop their innovations in multi-stakeholder environment will therefore be a welcome contribution to social entrepreneurship research.

Following from the knowledge gaps stipulated above, the aim of this chapter is to answer the following research question: what are the different approaches adopted by social entrepreneurs to translate their initial ideas into innovative solutions that (help to) address societal problems? Hence, this chapter focuses on the *process* of developing social innovations in the context of social entrepreneurship. The concept of responsible innovation is used in this chapter as a theoretical lens with which to analyse the process of how social entrepreneurs translate their initial ideas for innovation into final innovation outcomes. The main idea behind responsible innovation is that one can steer innovations in desirable directions by engaging in anticipatory governance of innovation based on deliberative forms of stakeholder engagement (Burget et al. 2017; Stilgoe et al. 2013). Hence, the framework of responsible innovation consists of several dimensions that make it particularly suitable to study the innovation process in social enterprises. First and foremost, stakeholder engagement and stakeholder deliberation are central in the framework of responsible innovation (Blok et al. 2015). Social entrepreneurship is also a political phenomenon, and entrepreneurs need to understand the values dimension of their work that need to be aligned with the 'social' objectives, which requires public participation and deliberation (Cho 2006). Responsible innovation provides a framework to explore the multi-stakeholder environment in which social entrepreneurs develop their innovative solutions. Second, it covers the role of anticipation in the development of innovations and can therefore build upon the work of Waddock and Steckler (2016). Third, it also draws attention to firm-internal processes such as reflexivity of the organisation (Stilgoe et al. 2013) and knowledge management of information flows inside and outside the company (Lubberink et al. 2017b), which is vital for successful social innovations in social enterprises (Kong 2010). Ultimately, it is about being responsive to the new insights, knowledge and (changing) stakeholder needs and values, which may require an adjustment of the innovation (Stilgoe et al. 2013).

The social entrepreneurs in this chapter are elected Ashoka fellows who developed and implemented innovative solutions for problems that have a profound impact on society (Ashoka 2011) and can be regarded as well-established and successful social entrepreneurs (Mair et al. 2012). The mixed methodology used in this study combines quantitative and qualitative approaches. The findings depend predominantly on the quantitative research, whereas subsequent contextualisation required qualitative content analyses. The quantitative approach is based on a self-assessment of responsible governance of innovation provided by 42 Ashoka social entrepreneurs. The qualitative approach involves analyses of the profile descriptions of each of these 42 social entrepreneurs, which serves to contextualise the results obtained from the quantitative self-assessments. In this chapter four typologies are proposed; this will help to unpack the heterogeneity found in social entrepreneurship, and is a common procedure in the research

field (e.g. Chandra & Shang (2017), Mair, Battilana, & Cardenas (2012), Waddock & Steckler, (2016) and Zahra, Gedajlovic, Neubaum, & Shulman (2009)).

This chapter contributes to the literature on social entrepreneurship as it provides typologies of innovation processes in which different dimensions of managing the innovation process may be more or less present and in different combinations, thereby being responsive to the expected heterogeneity of the phenomenon. The use of responsible innovation as a framework for investigating innovation processes sheds light on a wide array of different dimensions that are vital for innovation in social enterprises. The context of social entrepreneurship is complex and diverse, and has a profound impact on the enactment thereof (De Bruin & Lewis 2015). Consequently, *"a breakthrough would then allow incorporation of contextual variables or even contextualisation of empirical social entrepreneurship research in a second step"* (Sassmannshausen & Volkmann 2016, p.10). The current article aims to achieve this by complementing the quantitative analyses of questionnaire data about the innovation process with qualitative data from the profile descriptions.

This paper begins with an overview of the concept of social entrepreneurship and its sub-concept social innovation. This is complemented with the theoretical dimensions of the concept of responsible innovation and why it is a relevant lens through which to assess how social entrepreneurs develop their innovative solutions for societal problems. It will then go on to the materials and methods used to identify the different approaches for translating initial ideas for innovation into final innovation outcomes. The results section presents the findings of the research, focusing on the different typologies of innovation processes that are identified. The paper concludes with the implications of these different approaches to innovation for the field of social entrepreneurship, and compares its findings with insights from previous empirical investigations of social entrepreneurship.

4.2. Theoretical Framework

Social Entrepreneurship and Innovation

Previous social entrepreneurship research revolved primarily around its definition and conceptualisation (Granados et al. 2011; Sassmannshausen & Volkmann 2016; Kraus et al. 2014). However, even though there is no consensus yet about the definition of social entrepreneurship (Choi & Majumdar 2014), a definition should logically draw upon entrepreneurial processes that require opportunity exploitation and resource (re)combination processes (Newth & Woods 2014). The following definition of social entrepreneurship by Peredo & McLean (2006) is therefore deemed suitable as a working definition of social entrepreneurship:

> *"Social entrepreneurship is exercised where some person or group: (1) aim(s) at creating social*
> *value, either exclusively or at least in some prominent way; (2) show(s) a capacity to recognize*
> *and take advantage of opportunities to create that value ("envision"); (3) employ(s)*
> *innovation, ranging from outright invention to adapting someone else's novelty, in creating*
> *and/or distributing social value; (4) is/are willing to accept an above-average degree of risk*

in creating and disseminating social value; and (5) is/are unusually resourceful in being relatively undaunted by scarce assets in pursuing their social venture" (2006, p.64).

Social value can be understood as the value for society that is generated by solving a societal problem or responding to pressing social needs (Alvord et al. 2004) and is a necessary condition for social entrepreneurship (Choi & Majumdar 2014). However, since social entrepreneurs are also economic actors in society, they also have to capture value (i.e. revenues) to sustain their social value creation (Santos 2012). Social entrepreneurship therefore requires a combination of social welfare logic *and* economic logic. While social value creation is a necessary condition, Choi and Majumdar (2014) argue that the social entrepreneur(s), the organisation, market-orientation and social innovation are sufficient conditions which presence may differ case-to-case.

Social entrepreneurship research has predominantly focused on more general studies that describe or define social entrepreneurship (Sassmannshausen & Volkmann 2016). However, in-depth investigations should also take place regarding the sub-concepts of social entrepreneurship (Choi & Majumdar 2014). Several articles have been published in which parts of the social entrepreneurship phenomenon are investigated in more detail, but which also include a description of the apparent heterogeneity within these sub-parts. For example, Chandra & Shang (2017) explored how combinations of social skills and the social position may have enabled the founders to pursue their social entrepreneurship career. Hence, they focused on the social entrepreneur and more specifically the biographical antecedents that enable them to combine dual identities. Likewise, the empirical study by Waddock & Steckler (2016) describes three types of social entrepreneurs when exploring how vision, intention and action relate to each other. Visionaries indeed have a clear vision that guides their entrepreneurial action. However, inadvertent wayfinders start to act and often cannot really formulate a clear vision, while for the emergent wayfinders the vision only crystallises after they have made sense of their actions. Mair et al. (2012) explored how social entrepreneurs are able to create social change to resolve societal problems. Their empirical study identified four different types of social change-making processes that relied on the creation and leveraging of either political, social, economic or human capital. In other words, they investigated the social innovation outcomes and the associated social change, but did not focus on the process by which these social innovations emerged from initial ideas. And lastly, Zahra, Gedajlovic, Neubaum, & Shulman (2009) conceptualised three types of social entrepreneurs by building on different notions of entrepreneurship, which come from the works of respectively Hayek, Kirzner and Schumpeter. The typologies differ for example in their search processes, the impact on the social system and resource (re)combination processes. Social bricoleurs discover and respond to local and small-scale social needs. Social constructionists discover and exploit opportunities to respond to underserved clients to subsequently introduce innovations to broader social systems; they mend the social fabric where it is torn. Whereas social engineers discover systemic problems that require revolutionary change; they overthrow dated systems to replace them with novel better ones. To conclude, different attempts have been made to do justice to the heterogeneity that can be found in the social entrepreneurship process and its related sub-concepts (e.g. the person, entrepreneurial vision and innovation outcomes).

This chapter focuses on one of the sub-concepts in social entrepreneurship, namely their innovations that (help to) solve a societal problem or pressing social need. While social entrepreneurs are described as innovative individuals, they do not always develop novel solutions for societal problems. For example, a social entrepreneur could start a work integration social enterprise and be innovative in marketing the products that it aims to sell. Yet, it does not mean that the solution for a societal problem is based on a novel idea or approach. This chapter explores the innovation processes of social entrepreneurs who have turned novel ideas into innovative solutions that (help to) solve societal problems or pressing social needs. Such innovations are often, but not always, accompanied by necessary social change and are therefore also called social innovations. The concept of social innovation is discussed in the following section.

Social Innovation

There have been discussions about the definition and conceptualisation of social innovation (e.g. Bacq & Janssen (2011); Huybrechts & Nicholls (2012) Peredo & McLean (2006)). This was primarily due to two different dominant views as to what social innovation entails, which focused either on social relations or social impact. Lately, there has been a de-contestation of social innovation with the convergence of these two approaches to social innovation (Ayob et al. 2016). This convergence is evident in the definition provided by Murray, Caulier-Grice, and Mulgan (2010) who define social innovations as:

> *"innovations that are social both in their ends and in their means. Specifically, we define social innovations as new ideas (products, services and models) that simultaneously meet social needs and create new social relationships or collaborations. In other words, they are innovations that are both good for society and enhance society's capacity to act" (p.3).*

The more radical proponents of this view approach social innovations as a means of politically transforming society by creating new social and power relations; for example, by developing innovations to empower citizens or the marginalised (Ayob et al. 2016).

Phillips et al. (2015) reviewed the literature to identify the linkages between social innovation and social entrepreneurship. Social innovation and social entrepreneurship both aim to pursue a social objective or mission, and involve a problem-solving opportunity to meet a social need. However, social innovation also implies that the innovation is accompanied by changes in the social system. While this may indeed be the case for some social entrepreneurs (e.g. social engineers), it is not necessarily true of all social entrepreneurs. Furthermore, social innovation is not confined to social entrepreneurship; for-profit or non-profit enterprises as well as governmental organisations can also develop and implement innovative ideas that create change for the benefit of society. And even though social innovation and social entrepreneurship are both about pursuing a social objective, their processes are portrayed differently in the literature. Social entrepreneurship research often depicts the lone visionary who aims to create social change, whereas the focus on social innovation is on the collective and dynamic interplay of actors who together aim to create social change (Phillips et al. 2015).

The social innovation outcomes can manifest as products, production processes, technologies, services, interventions, business models or a combination of all of these, thereby differing in the extent of formalisation (Choi & Majumdar 2015). However, the innovative solution may also induce or require social change processes, especially in cases where social entrepreneurs need to challenge the social systems that created the problems they address. In those cases, social entrepreneurs turn into institutional entrepreneurs and act as change agents in society (Westley et al. 2014). This understanding resonates with the social constructionists who aim to mend social fabrics, or social engineers who introduce effective new social systems to replace former systems that are ill-equipped to address social needs (Zahra et al. 2009). Hence, social entrepreneurship can be advanced by looking into the concept of social innovation, while doing justice to the collective nature of social innovation processes (Phillips et al. 2015).

Studying the innovation processes in social entrepreneurship is thus expected to benefit from stakeholder, relational and network perspectives (Shaw & de Bruin 2013; Smith et al. 2013). Social innovations are implicitly and explicitly formed by the expectations and demands of stakeholders, which makes it essential to have a thorough understanding of the social issue at hand and how the innovation can be developed (Newth & Woods 2014). However, this can be challenging in social systems where stakeholders have different (sometimes conflicting) expectations, beliefs and logics (Smith et al. 2013). The stakeholders who are needed to provide legitimacy for the innovation can therefore also be a source of resistance (Newth & Woods 2014). Social entrepreneurs are aware of this and may use different rhetorical strategies to persuade stakeholders of the legitimacy of their organisation and their innovative ideas (Ruebottom 2013). However, one could question whether such innovations are 'social' since they are not the result of a public political process. In fact, it is then merely the entrepreneur's conception of 'the good' that he or she aims to pursue (Cho 2006). Social enterprises must therefore not only develop innovations whose implications are aligned with the social mission of the firm, but also take into account the different, sometimes opposing, views of their stakeholders.

This chapter aims to explore how social entrepreneurs advance from their initial ideas for innovation to the final innovative solutions, while managing their stakeholder network and their own social mission. It thereby responds to Phillips et al. (2015) to include the collective nature of social innovation when studying the development of innovations in social entrepreneurship. The framework of responsible innovation serves as a research lens through which to explore the development of innovations by social entrepreneurs, and is therefore elaborated upon in the next section.

Responsible Innovation

Responsible innovation is a new and emerging concept developed by researchers and policy makers with the aim of stimulating anticipatory governance of innovation based on deliberative forms of stakeholder engagement. It considers the development of innovations as a political process as the implications of the innovation may have a profound impact on the public. The development of responsible innovations is therefore only considered as 'responsible' when the innovation *process* is based on public participation and

deliberation (Stilgoe et al. 2013), which is not necessarily the case in social innovation (Lubberink et al. 2017a)[10] nor social entrepreneurship (Cho 2006).

Stilgoe et al. (2013) developed an influential framework consisting of four dimensions that can be used heuristically to accomplish responsible governance of innovation. These four dimensions are: anticipation, reflexivity, inclusion and responsiveness. This is an influential framework within the field of responsible innovation as these dimensions recur throughout the works of scholars researching responsible innovation (Burget et al. 2017). However, the framework by Stilgoe et al. (2013) is based on discussions that primarily took place among scientists regarding 'good science' and 'good technology'. This resulted in findings focusing primarily on responsible research and technological development. The applicability of the current concept of responsible innovation in the business context is therefore questionable (Blok & Lemmens 2015). For example, including stakeholders at the start and deliberating with them about the innovation is at odds with the notion that innovations are based on information asymmetries in the market that are recognised by the entrepreneur. Sharing information with stakeholders to deliberate about the innovation can therefore challenge the entrepreneur's source of competitive advantage (Blok & Lemmens 2015).

In response to the issues raised, Lubberink, Blok, van Ophem, & Omta (2017b) reviewed empirical evidence from social, sustainable and responsible innovation practices and processes in the business context to give practical substance to the framework proposed by Stilgoe et al. (2013). This resulted in an adjusted framework for responsible innovation that can be used for further operationalisation and assessment of responsible innovation in the business context. Lubberink et al. (2017b) proposed that inclusion and deliberation are two distinctive dimensions of responsible innovation, and further identified knowledge management as an additional dimension of responsible innovation in the business context. Based on the framework by Stilgoe et al. (2013) and complemented by the findings by Lubberink et al. (2017b), the following dimensions are used as a lens for understanding the development of innovation in social enterprises.

Anticipation revolves around opening up innovation to multiple views that help to foresee any *"known, likely, plausible and possible implications of the innovation that is to be developed"* (Stilgoe et al. 2013, p.1570). Foresight-enhancing activities do not focus on predicting futures, instead it aims to increase resilience and adaptivity. Lubberink et al. (2017b) suggest innovators to engage in multiple activities to better understand the innovation context and the needs of the stakeholder environment, which can subsequently be translated in a plan for development. Furthermore, innovations in general, and systems-changing innovations in particular, can benefit from generating multiple scenarios how the development of innovations could lead to its successful implementation (Lubberink et al. 2017b). *Reflexivity* is about critically

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[10] In this chapter, the aim is to inform the reader why responsible innovation can serve as a suitable lens to study social innovations in social entrepreneurship. However, it is suggested to read Lubberink et al. (2017a) for an extensive discussion about the differences and similarities between social innovation and responsible innovation, as a thorough discussion goes beyond the aim of this chapter.

scrutinising one's own *"activities, commitments and assumptions, and being aware of the limits of knowledge and the fact that [one's reality] may not be universally held"* (Stilgoe et al. 2013, p.1571). Lubberink et al. (2017b) argue that reflexivity revolves around role of the firm itself in developing the innovation. Reflexive innovators reflect on whether their innovation leads to the desired innovation outcome, and whether the decision-making is in line with their norms, values and beliefs. Furthermore, having a diverse group of employees who share their views on the development of the innovation is an indicator of enhanced reflexivity (Lubberink et al. 2017b). In addition, innovators need to blur the lines between their role responsibility and their wider moral responsibilities (Stilgoe et al. 2013). However, social entrepreneurs are by nature aware of their moral responsibilities as they have a normative orientation that focuses on their social role in addition to being an economic agent (Moss et al. 2011). *Inclusion* is the actual involvement of stakeholders and the wider public with dialogue or other attempts that can help to steer an innovation in the desired direction. The stakeholder network is ideally comprised of stakeholders who can provide the necessary resources (i.e. organisational and know-how), respect each other's roles and are committed throughout the process of developing the innovation (Lubberink et al. 2017b). *Deliberation* is about the openness and quality of the discussion. It involves an exchange of views and opinions among stakeholders and between stakeholders and the social entrepreneur(s). Ideally, deliberation facilitates awareness and reconciliation of different stakeholder interests. Providing relevant information to form an opinion, and being open about how decisions are made fosters deliberation, and hence decision-making. Sometimes, stakeholders have actual decision-making power when it comes to the steering of the innovation process and desired outcomes (Lubberink et al. 2017b). *Responsiveness* is about acting on the insights obtained when engaging in the aforementioned dimensions, which implies having the capacity to develop the innovation in response to the values of stakeholders, the wider public and changing circumstances (Stilgoe et al. 2013). Furthermore, it is about actually adjusting courses of action and responding to new knowledge, perspectives, views and norms that emerge during innovation. This chapter looked at actual responsive behaviour (i.e. the actual changes in the innovation process, innovation outcome, required adaptation of the stakeholders) or the capacity to adjust if it were deemed necessary. Consequently, *knowledge management* is a dimension that Lubberink et al. (2017b) added to the framework. Derived from knowledge-based dynamic capabilities (Denford 2013) it covers actions to overcome practical knowledge gaps that can arise with innovation: for instance, creating knowledge within the firm, creating knowledge with other external actors, or obtaining knowledge from external sources, and subsequently integrating it into the innovation process (Lubberink et al. 2017b).

The framework of responsible innovation is expected to shed light on how social entrepreneurs develop their innovative solutions for societal problems. For example, the dimension of anticipation may shed light on the role of foresight and strategic planning, which Weerawardena and Mort (2006) regard as vital, while Waddock and Steckler (2016) showed that this may differ between social entrepreneurs; whereas stakeholder inclusion and stakeholder deliberation will provide insights into the collective nature of innovation in social entrepreneurship, an area still understudied in its field (Phillips et al. 2015).

Because the dimensions and key activities developed by Lubberink et al. (2017b) are developed based on empirical studies in the business context and can serve as the basis for further operationalisation, they are most suitable to be used as input for the self-assessment questionnaire on responsible innovation in the business context. Therefore, this chapter assesses the implementation of anticipation, reflexivity, inclusion, deliberation, responsiveness and knowledge management to develop innovative solutions for societal problems by social entrepreneurs.

4.3. Materials and Methods

This research aims to explore different typologies of innovation processes by social entrepreneurs. Using quantitative research methods it was possible to identify the different approaches adopted by social enterprises to develop innovative solutions for societal problems. Subsequent qualitative content analyses took place to contextualise the different approaches, resulting in a mixed-methodological design. The quantitative research methods are based on data obtained from questionnaires sent to Ashoka fellows who founded their social ventures in the United States, Canada and Europe[11].

> *"Ashoka fellows are visionaries who develop innovative solutions that fundamentally change how society operates. They find what is not working and address the problem by changing the system, spreading the solution, and persuading entire societies to take new leaps"* (Ashoka 2011, p.11).

Or as Ashoka's founder Bill Drayton describes them: *"Social entrepreneurs are not content just to give or teach how to fish. They will not rest until they have revolutionized the fishing industry"* (Ashoka 2011, p.10). This Schumpeterian understanding of social entrepreneurship is present in multiple definitions of social entrepreneurship, and is general and robust enough to explain processes of innovation for social change (Newth & Woods 2014). All Ashoka fellows successfully went through a meticulous selection process at Ashoka, which required amongst other things that the entrepreneur developed a new solution or approach to tackling a problem that (potentially) has a profound impact on society. It is therefore assumed that the respondents in our sample have developed social innovations. This implies that the results are not representative for all manifestations of social entrepreneurship.

All information that Ashoka generates during this selection process is comprised into a profile description of each of their fellows, the latter are publicly available on their website (www.ashoka.org). These profile descriptions contain extensive information about the problem addressed, the new innovative solution(s), the strategy for how the innovation will solve the problem, and his or her biographical information. Consequently, these profile descriptions have previously been used for social entrepreneurship

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[11] The focus on United States, Canada and Europe is because the framework of responsible innovation emerged from a European discourse and cannot be applied as an a-priori framework for innovation in the global South (Macnaghten et al. 2014).

research (Chandra and Shang 2017; Mair, Battilana, and Cardenas 2012; Meyskens et al. 2010). However, these studies focused in this respective order on biographical antecedents, social change processes, and resource (re)combinations in the entrepreneurship process. This chapter focuses on the process by which social entrepreneurs develop their innovative solutions, and that required information that was obtained with questionnaires. The profile descriptions therefore provide complementary data, which is used to contextualise the findings from quantitative analyses.

The quantitative research is based on questionnaires that are sent to social entrepreneurs (n≈270)[12]. The questionnaire covers all dimensions of the innovation process as proposed by Lubberink et al. (2017b). Each dimension is measured by several items, i.e. questions or statements, which can be answered using a 7-point Likert scale. These items are inspired by the key activities and strategies proposed for each dimension in the refined framework by Lubberink et al. (2017b). The questionnaire was refined based on feedback from scientists with expertise in responsible innovation and entrepreneurship and social entrepreneurs, followed by a final revision based on feedback from a methodologist whose expertise lies in questionnaire development. The questionnaire measures the extent to which social entrepreneurs engage in responsible innovation dimensions during the innovation process. Additional questions were added to measure contextual factors that could not be obtained from the Ashoka profile descriptions. The complete questionnaire can be found in Appendix A.

This chapter investigated social entrepreneurs who were elected as Ashoka fellows in 2010 or more recently. This was taken as a cut-off date to reduce the recall bias of respondents, as the ability to accurately remember previous events diminishes with time. Additionally, it was decided to ask questions about facts and behaviours rather than beliefs or intentions (Golden 1992). The fellows were invited to complete the questionnaire by e-mail, and received reminders by e-mail and follow-up phone calls with the request to fill in the questionnaire. The quantitative data were obtained between April and July 2016.

The clustering method was based on the average scores for all six responsible innovation dimensions[13] collectively. The quantitative data analysis involved an average-linkage hierarchical cluster analysis, as it takes into account the cluster structure and is a relatively robust hierarchical clustering method (Everitt et al. 2011b). This method also yielded clusters that were significantly distinctive from each other either on the average implementation of all dimensions, or they had significantly higher or lower scores for one or more dimensions of the responsible innovation framework. The hierarchical clustering method that was employed in this chapter did not create equal-sized clusters, as opposed to Ward's method. This also fits with the purpose of this research to explore different types of innovation processes, which may not take place in comparable cluster sizes. The optimum number of clusters were derived by interpreting the

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[12] These are the number of e-mail recipients to whom the questionnaire was sent. However, some social enterprises were founded by two or more entrepreneurs. In other cases, other e-mails were suggested by the secretaries to get in direct contact with the founder. Therefore, the actual number of enterprises contacted was lower than 270.

[13] The frequency of contacts with stakeholders is not included in the clustering method as it only gives information about the number of contacts with each type of stakeholder but does not give insights into the quality of the contacts. Hence, it is used as contextual information for the inclusion and deliberation dimensions.

dendogram and the proposed clusters. Since this is inherently a matter of subjectivity, Everitt et al. (2011a) suggests complementing this with statistical techniques, as in stopping rules that help to determine the optimum number of clusters present in the data. Milligan and Cooper (1985) conducted a simulated experiment and found that the pseudo-F index (Calinski & Harabasz 1974) and the Je(2)/Je(1) index (Duda & Hart 1973) are the most effective stopping rules. Stata, the software for statistical analyses, was used to run these two stopping rules[14].

There were 42 participants who completed the questionnaire, which represents a response rate of 15.5%. However, one respondent had too many missing values to be included in further analyses. Two respondents were assigned to their own individual cluster, independent of the number of clusters chosen. Since their scores on the responsible innovation dimensions were unique, the decision was made to exclude them from further analysis. This resulted in 39 respondents for the final cluster solution.

The qualitative study involves content analyses of profile descriptions[15] (obtained from the Ashoka website) of the 39 social entrepreneurs who completed the questionnaire. The results served to contextualise the findings obtained after quantitative analyses of the questionnaire data. All social phenomena take place in specific contexts that influence particular forms of behaviour (Zahra et al. 2014). Contextualisation aims to map out the micro-processes and contingencies that affect the social phenomenon under study, for example the development and implementation of innovations (Garud et al. 2014; Shaw & de Bruin 2013). Furthermore, contextualisation helps to describe phenomena in detail, to generate multiple explanations for the phenomenon and to clarify relationships between contextual factors and the phenomenon under study (Rousseau & Fried 2001). The contextual factors that are integrated in this study come from Mair, Battilana, and Cardenas (2012). Based on profile descriptions of Ashoka fellows and entrepreneurs of the Schwab foundation, they inductively developed coding schemes to categorise the problem addressed, the target constituencies, the actions taken and the justification for the solution. Their focus on the problem addressed and the solution proposed is complementary to the focus of this chapter, which is the process dimension of developing innovations. Since their coding schemes are thoroughly tested, they are therefore used for deductive coding of the profile descriptions of the respondents in this chapter.

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[14] The Calinski and Harabasz pseudo-F stopping rule index calculates the ratio of total variation between clusters versus total variation within a cluster. It provides values for the different cluster solutions in hierarchical clustering procedures. The optimum number of clusters is the highest value among the cluster solutions. The Je(2)/Je(1) index (Duda & Hart 1973) proposed a ratio criterion where Je(2) is the sum of the squared errors within a cluster when the data are broken into two clusters, and Je(1) provides the squared errors when there is one cluster. The rule for deciding the number of clusters is to determine the largest Je(2)/Je(1) value that corresponds to a low pseudo-T2 value and has a higher T2 value above and below it.

[15] The profile descriptions contained on average 2141 words, with 535 words standard deviation

Control Variables

There were four control variables that could not be obtained from the profile descriptions. These were therefore integrated in the questionnaire. First, previous entrepreneurial experience is added as a control variable because Baron and Ensley (2006) found that experienced entrepreneurs generate business ideas that are clearer and more focused on financial viability than novice entrepreneurs who focus on the uniqueness of their ideas and follow gut feeling. Second, the need for economic return so that the innovation can be(come) self-sustaining is added as a control variable because Ebrahim et al. (2014) found different governance challenges regarding mission drift and accountability. These differences were observed between social enterprises that depend on the economic value generated by their social innovations versus social enterprises that support their social innovations with other innovations in their portfolio. The third control variable follows a similar line of thought, as the percentage of firm revenues that come from direct sales of their services or products is also controlled for. Organisations reporting that less than 5% of their revenues come from direct sales are not expected to adopt market logic in their decision-making (Lepoutre et al. 2011). The need for social innovations to generate demand affects the design of the innovation (Newth & Woods 2014). Fourth, the level of experienced uncertainty of the innovator regarding the future implications of their innovation is added as a control variable because matters of responsibility are more problematic and ambiguous for innovators who are more uncertain about the future implications of current actions (Pandza & Ellwood 2013).

4.4. Results

Descriptive Results

Table 9 provides an overview of the summary statistics for the variables of this study. The Cronbach's Alphas are acceptable when they are above 0.7 for narrow constructs and between 0.55 and 0.7 for moderately broad constructs (Van de Ven & Ferry 1980). The alpha coefficients of anticipation, inclusion, deliberation exceed 0.70. Therefore, these scales are sufficiently reliable for data analysis purposes. The scales for reflexivity, responsiveness and knowledge management range between 0.58 and 0.61 and are acceptable for moderately broad constructs[16]. Knowledge management and reflexivity are measured by only three items which can explain their lower Cronbach's α. The lower Cronbach's α for responsiveness can be explained by the fact that it is measured by quite diverse items. The scores of each cluster on the individual items that measure each construct of responsible innovation can be found in Figure B-1 up to Figure B-7 in Appendix B. Table B-1 displays the intercorrelations among the variables of this study. The correlations between the variables used in this study range between 0.02 and 0.593. Based on the correlations, it can be assumed that multicollinearity is not a problem in the database used for this study.

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[16] The Cronbach's Alphas would experience a minor increase if items were excluded. However, the theoretical added value of the items is more important in this research than the scale reliability.

Table 9. Summary statistics for the research variables

Variables	Mean	S.D.	Alpha	Number of items
Anticipation	5.25	1.22	0.74	3
Reflexivity	4.35	1.19	0.58	3
Inclusion	5.49	1	0.85	6
Deliberation	5.4	1.02	0.86	7
Responsiveness	4.71	1.15	0.58	4
Knowledge management	4.71	1.13	0.61	3

The cluster analysis was based on the researchers' interpretation of the dendogram and cluster typologies. The latter involves looking at whether the clusters differ significantly with regard to the average scores on all clusters, or one or more of the average scores on the dimensions. The results of the cluster analysis of the six responsible innovation dimensions suggested that the five-cluster solution best fits the data. This was complemented with two stopping rules in Stata; the Calinski-Harabasz pseudo-F index confirmed the number of clusters while the Duda-Hart index was inconclusive.

There is one cluster that consists of only two respondents, who provided extremely low scores for all responsible innovation dimensions. One respondent stated that the questions were less applicable to her case since the work was more instinctive and unplanned, especially in the beginning. This cluster is omitted from the results due to the small sample size (n=2) and the uniquely low scores, which allows a more detailed description of the typologies of the remaining four clusters. Based on an exploratory quantitative analysis of significant differences between the clusters, it was possible to identify and describe the variables that discriminate the respective typology from one or more of the other typologies.

Cluster Results

The overall mean scores on the dimensions of responsible innovation (see Table 9), as well as the scores of the four clusters on the six dimensions (Table 10), show that anticipation, inclusion and deliberation are the most implemented dimensions of responsible innovation. This means that the social entrepreneurs in general engaged in anticipatory governance of innovation and employed deliberative forms of stakeholder engagement during the development of their innovation. Furthermore, a recurring subject in the profile descriptions is the sense of social entrepreneurs 'making a difference' in the world, which resulted in their entrepreneurial action. Often these social entrepreneurs had formative experiences during their childhood (e.g. family life, schooling or religion) or earlier professional life, which gave rise to this attitude. This observation supports the findings by Waddock and Steckler (2016) after interviewing 23 social entrepreneurs about the pathways to their visions.

However, there are also important differences that can be observed between the clusters. The results indicate that cluster one primarily engages in anticipation, inclusion and deliberation, while scoring

relatively low on reflexivity, responsiveness and knowledge management. Cluster two scores relatively well on all dimensions of responsible innovation. Cluster three scores exceptionally well on anticipation, reflexivity, inclusion and knowledge management, but scores relatively low on responsiveness. Cluster four scores exceptionally well on anticipation, inclusion, deliberation and responsiveness, but relatively low on reflexivity. These differences between the clusters are tested with non-parametric tests (Table 10). The scores for each cluster are also graphically represented in Figure 4.
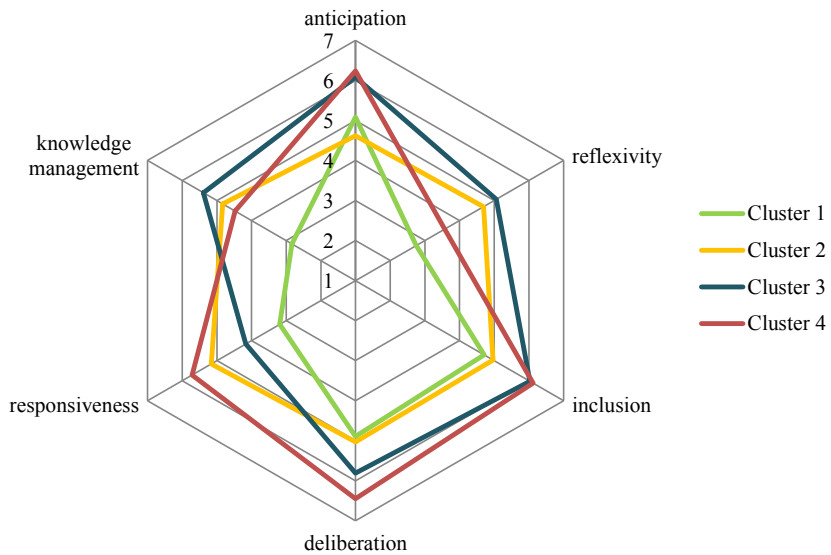
Figure 4. *Radar chart representing the average scores of the four clusters on each of the six dimensions of responsible innovation*

Table 10. *The median scores of each cluster on the six dimensions of responsible innovation, and non-parametric tests for significant differences between the cluster scores*

	Cluster Medians/ (lower to upper quartiles)				Kruskall-Wallis test		Mann-Whitney test with Bonferroni correction
	Cluster 1 (n=4)	Cluster 2 (n=14)	Cluster 3 (n=12)	Cluster 4 (n=7)	χ^2(df=3)	sign.	
Anticipation	5.00 (4.5 - 5,75)	4.33 (4.25 - 4,92)	6.00 (6.00 - 6.00)	6.00 (5.67 – 7.00)	19.819	,000	1 < 3
Reflexivity	2.83 (1.92 - 3.5)	4.67 (4.17 - 5.08)	5.33 (4.08 - 5.67)	4.00 (2.33 - 4.67)	14.682	,001	2 < 3, 4 1 < 2, 3
Inclusion	4.67 (3.88 - 5.58)	5.17 (4.13 - 5.83)	6.00 (5.38 - 6.83)	6.00 (5.67 - 6.5)	13.446	,001	2 < 3, 4
Deliberation	5.00 (4.21 - 5.46)	5.07 (4.39 - 5.46)	5.93 (5.21 - 6.36)	6.43 (6.00 - 7.00)	16.488	,000	1 < 4 2 < 4
Responsiveness	3.25 (2.31 - 4.00)	5.13 (4.44 - 6.00)	4.00 (3.50 - 4.75)	6.00 (5.25 - 6.25)	18.122	,000	1 < 2, 4 3 < 2, 4
Knowledge management	3.00 (2.17 - 3.33)	4.50 (4.33 - 5.67)	5.50 (4.75 - 6.00)	4.67 (4.00 - 5.33)	13.881	,001	1 < 2, 3

Notes, a < b means cluster *a* is has significant lower score than cluster b after Bonferroni correction. Data expressed as medians (lower to upper quartiles). χ^2 = Chi-square

The differences between the clusters were controlled by: percentage of income derived from the innovation, percentage of income from direct sales, certainty about the future implications of the innovation, and previous entrepreneurship experience. Separate univariate ANOVAs revealed that there are no significant differences in percentage of total income derived from the innovation between the clusters $F_{(3, 27)} = 0.333$, $p> 0,05$. Also, separate univariate ANOVAs revealed that there are no significant differences in percentage of total income derived from direct sales between the clusters $F_{(3, 28)} = 0.856$, $p> 0,05$. Furthermore, a Chi-Square test was executed based on the dummy variable [operating without market thinking (direct sales<5%) or with market thinking (direct sales>5%)] but also this test confirmed that there was no significant association between cluster membership and the presence or absence of market thinking $\chi^2 (3) = 2.085$, $p>0.05$. The Fisher's exact test confirms this result. Separate univariate ANOVAs revealed that there are no significant differences between the clusters regarding the level of certainty about the innovation's implications at the start of the innovation process $F_{(3, 33)} = 0.531$, $p> 0,05$. The Chi-Square test revealed that there was no significant association between cluster membership and the number of previous companies founded $\chi^2 (6) = 6.355$, $p>0.05$. The Fisher's exact test confirms this result. Therefore, the identified cluster differences cannot be explained by any of the control variables.

Each of the four different cluster typologies is described individually in the remainder of the results section. These descriptions are based on the results from quantitative exploratory analysis, and include insights not only at the level of the dimensions but also at the level of the individual items measuring the dimensions. Furthermore, descriptions of the typologies aim to characterise the respective cluster of social enterprises compared to the others in the sample. The scores on each of these underlying items are graphically represented for each individual dimension, and can be found in Appendix B.

The rushing social innovators.   The social entrepreneurs in this innovation typology can be considered as the 'rushing' innovators. Their innovations ensue from anticipation as the development of their innovation is guided by a plan for development and they think of sufficient scenarios to implement the innovation. Yet, it is rare for these social entrepreneurs to take a reflexive stance while developing their innovation. They rarely assess whether the development of the innovation still leads to the desired innovation outcome, or whether the decision-making is still in line with their own norms, values and beliefs. In the cases of *Ruvo, Jaar* and *Frehe* this can be explained by the fact that they were forced to work on a solution for a societal problem that they experienced themselves, before they were social entrepreneurs. Since their solution turned out to be effective in their particular case, they developed it into an innovation that can easily be scaled. The fact that they acted upon their idea of how to solve their own problem, and it was effective in their situation, could explain why they were less engaged in reflexivity during innovation.

The rushing entrepreneurs have relatively few contacts with stakeholders who will provide them with insights and/or opinions regarding the innovation in its developmental phase. The stakeholders who shared their insights most frequently were customers and suppliers, the people/community affected, and sometimes experts or consultants. Their stakeholder network only functions to a limited extent.

Furthermore, their innovation process is less transparent than that of the other entrepreneurs. Stakeholders can only partly see how decisions are made and how they influence the development of the innovation. There are relatively few activities that encourage stakeholder dialogue, and the dialogues that do take place only partly help to address different stakeholder interests.

In the end, the innovation processes and outcomes do not differ from the initial idea of the social entrepreneurs. Furthermore, they had relatively the least capabilities in place to make adjustments, were it necessary. There are also relatively few activities to address the knowledge gaps regarding the process, outcome or impact of the innovation in this cluster. An overview of the characteristics of the 'rushing' social entrepreneurs and their enterprises, and a description of their innovations can be found in Table 11. Figure 5 is a graphical representation of their scores on every dimension of responsible innovation compared to the mean scores of the other three typologies.

Table 11. *Overview of the social entrepreneurs considered as 'rushing'*

Firm	Firm size	Year of starting the development of the innovation	Number of companies founded before current firm	Field of work	Short description of the innovation
Kejo	Micro	2007	2≤	Health	Medical innovation for communities
Jaar	Micro	2003	none	Economic development	Professionalising work for the disabled
Ruvo	Micro	1996	none	Learning/Education	Program preventing youth from entering criminal careers
Frhe	Small	2002	2≤	Economic development	Reviving communities in depopulated areas

MICRO firms with fewer than 10 employees, *SMALL* firms with 10 to 50 employees, *MEDIUM* firms with 50 to 250 employees
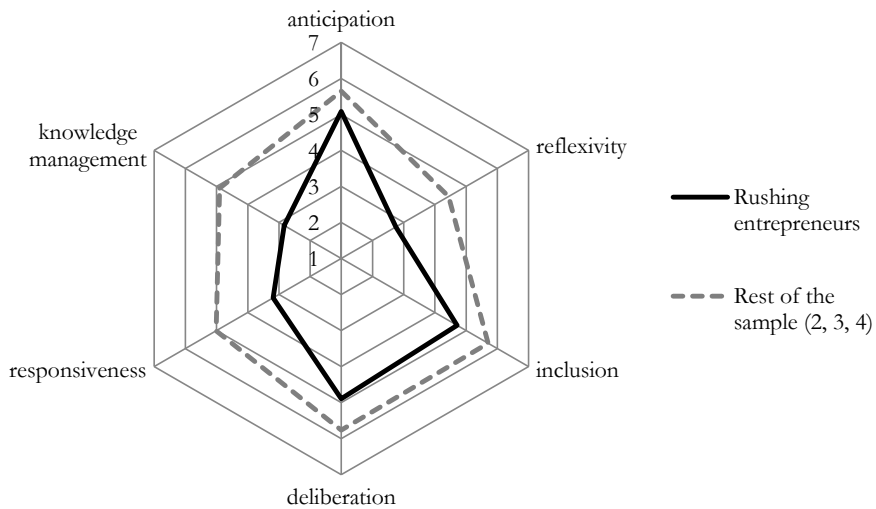
Figure 5. *Radar chart representing the average scores of the 'rushing' entrepreneurs on each of the six dimensions of responsible innovation contrasted with the average scores of the rest of the sample.*

The wayfinding social innovators. The second typology of innovation management is based on social entrepreneurs who can be considered 'wayfinding' and perform relatively well on all dimensions. However, they are less engaged in following a clear plan to develop their innovation, nor do they think of sufficient scenarios for implementing the innovation, especially in contrast to the visionary entrepreneurs in the sample. Even though they are not visionary social entrepreneurs, they do take a reflexive stance during the development of their social innovation. They are most frequently assessing whether the decision-making is in line with their norms, values and beliefs. Furthermore, they often have people with different personal and professional backgrounds who share their perspectives on how to develop the innovation. Furthermore, there are quarterly evaluations on whether their innovation activities are leading to the desired innovation.

Like other social entrepreneurs, they most often engage with the community/people affected and customers/suppliers. Furthermore, NGOs and other (social) entrepreneurs share their insights and opinions regarding the innovation. However, the social entrepreneurs in this cluster are less satisfied regarding the overall functioning of the stakeholder network. The involved stakeholders lack the right expertise and know-how to contribute to the innovation. Furthermore, the stakeholders do not have the right organisational skills to contribute to the innovation, and have difficulty respecting each stakeholder's role in the development of the innovation. The stakeholders were also not involved throughout the whole process. In other words, the entrepreneurs develop their innovation in a resource-poor environment, and find it difficult to manage the stakeholders.

The stakeholders of these social entrepreneurs have relatively little decision-making power concerning the development of the innovation, and they cannot really see how decisions are made during innovation. However, the social entrepreneurs do make sure that stakeholders have all the information

necessary to form an opinion about the innovation. And they organise sufficient activities to encourage dialogues between stakeholders to help address different stakeholder interests. Wayfinding entrepreneurs thus appear to be open to stakeholders, but like to stay in control of the innovation process.

The 'wayfinding' entrepreneurs are exceptionally responsive, because they end up with a vastly different innovation process from what they initially foresee. However, they are not the only responsive actors, as their stakeholder environment also needs to adjust to allow implementation of the innovation. When it comes to knowledge management, they are primarily looking to internalise knowledge from beyond their walls and they mainly develop knowledge together with external stakeholders. An overview of the characteristics of the 'wayfinding' social entrepreneurs and their enterprises, and a description of their innovations can be found in Table 12. The radar chart in Figure 6 is a graphical representation of their scores on every dimension of responsible innovation compared to the mean scores of the other three typologies.

Table 12. *Overview of the social entrepreneurs considered as 'wayfinding' entrepreneurs*

| Firm	Firm size	Year of starting the development of the innovation	Number of companies founded before current firm	Field of work	Short description of the innovation
Duch	Medium	1990	none	Economic development	National introduction of social entrepreneurship
Leis	Small	2005	2≤	Economic development	Empowering people to achieve work-life balance
Mame	Micro	2009	none	Learning/education	Enhancing teachers' socio-emotional skills
Frka	Small	1989	2≤	Civic engagement	Enabling mobility of elderly who cannot drive
Drje	Micro	1999	none	Civic engagement	Supporting journalism in repressive countries
Cabr	Micro	2001	1	Economic development	Transparent and ethical banking services
Guta	Micro	2002	2≤	Civic engagement	Ingraining civic participation by teaching about democracy
Ruro	Small	1993	2≤	Learning/education	Peer-based education system
Voat	Small	2007	2≤	Economic development	Support for people facing insolvency
Hofr	Micro	2005	2≤	Health	Novel medical examination method
Meem	Small	N/A	none	Health	Social and professional rehabilitation of homeless
Blbr	N/A	2007	2≤	Health	Fuelling promising medical research for rare diseases
Mara	Small	1989	1	Health	Innovative and efficient organ donation & transplantation system
Duna	Small	2008	2≤	Civic engagement	Preparing prisoners to become active participants of society
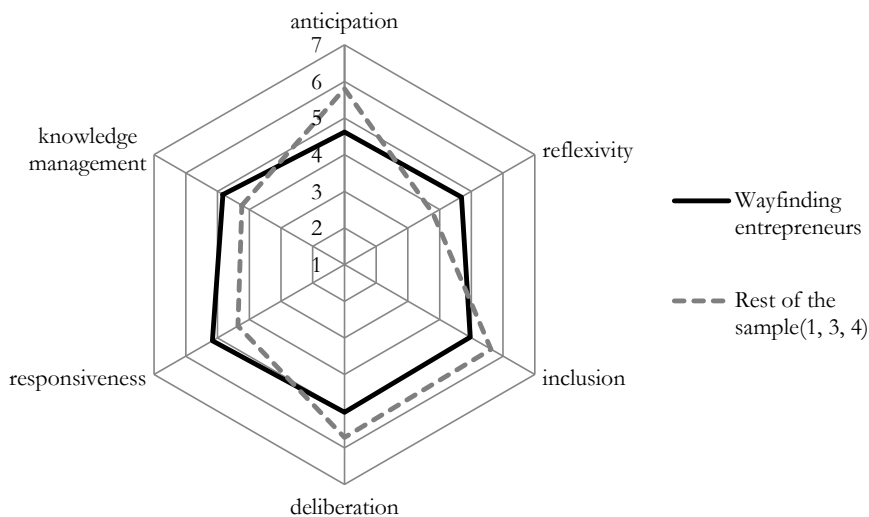
Figure 6. *Radar chart representing the average scores of the 'wayfinding' entrepreneurs on each of the six dimensions of responsible innovation contrasted with the average scores of the rest of the sample.*

The 'rigid visionary' social innovators. The typology of social entrepreneurs that can be considered 'rigid visionary' is comprised of social enterprises that engage in all dimensions of responsible innovation except for responsiveness. They can be considered as visionary entrepreneurs as they are highly engaged in anticipation. Illustrative cases involve social entrepreneurs who have actually experienced the neglected societal problem or pressing social need themselves or they have a family member or a friend who is confronted with inadequate social services. This type of social entrepreneur follows a plan for development and thinks of sufficient scenarios to implement the innovation. For example, *Erit* saw citizens abroad initiating activities to raise money for civil society organisations (CSOs). Inspired by this, they developed a social innovation to stimulate citizens in their homeland to start similar initiatives, as they knew that CSOs were struggling to make an impact. Another example is *Kolo,* who has designed her social innovation based on an already accepted principle in the healthcare context:

> *"inspired by the concept of a storage container or pillbox used to facilitate medicine dosages*
> *[...] his/her vision [is] a new type of "dosing" becomes commonplace [...] [where] the "dosage*
> *boxes" for elderly patients can be filled with activities, not just drugs or medicine".*

The rigid visionary social entrepreneurs are highly reflexive, as people with different professional backgrounds share their opinions on how to develop the innovation on an almost weekly basis. There are also weekly reflections on whether decision-making is in line with their norms, values and beliefs.

Furthermore, they are most often evaluating whether the innovation activities are actually leading to the desired innovation. They persist in the belief that the development of their innovations is driven by their own norms, values and beliefs. For example, *Abab* is visually impaired and experienced marginalisation as a member of an already marginalised community: *"[his/her] passion for the rights of [the marginalised], and their inclusion and empowerment, was fuelled by moral outrage born from personal experience"*. These rigid visionary social entrepreneurs also aim to make sure that their innovation stays close to their principles, as is the case with *Krho*, who is committed to making sure that: *"all [...] activities are based on three guiding principles to which all participating [organisations] must be firmly committed"*.

The rigid visionary social entrepreneurs are highly engaged in stakeholder engagement, as the people/community affected, their supply-chain partners and NGOs provided them with insights on a weekly basis. They also had relatively frequent contacts with other entrepreneurs and financiers who offered their perspectives on the innovation. Not only are there frequent occasions for sharing insights, they also have a functioning stakeholder network with the right organisational skills, know-how and motivation to contribute to the innovation.

However, compared to negotiating visionaries, the stakeholders of these rigid visionary social entrepreneurs have relatively little decision-making power. Furthermore, they do not deviate from their initial plan, as their innovation process and the innovation outcome are similar to their initial plan. In fact, it is their stakeholders who have to adapt to the innovation to ensure that it is successfully implemented. Following on from this, one could argue that rigid visionary social entrepreneurs develop their innovations based on their own norms, values and beliefs, and they are committed to making sure that their innovation process and outcome live up to those norms, values and beliefs. However, this might be at the cost of possible adaptiveness of the innovation.

The social entrepreneurs following this approach to innovation are highly engaged in solving any knowledge gaps with regard to the process, outcome or the impact of the innovation. There are weekly activities leading to intra-firm knowledge generation and their staff members scan and bring in the necessary knowledge with the same frequency. There are also frequent activities for developing knowledge with external stakeholders or absorbing it from them. These social entrepreneurs can therefore be considered as 'rigid visionaries', since they focus on anticipation and reflexivity, engage with stakeholders, but do not deviate from their initial ideas when it comes to the management of their innovation process and desired innovation outcome. An overview of the characteristics of the 'rigid visionary' social entrepreneurs and their enterprises, and a description of their innovations can be found in Table 13. The radar chart in Figure 7 is a graphical representation of their scores on every dimension of responsible innovation compared to the mean scores of the other three typologies.

Table 13. *Overview of the social entrepreneurs considered 'rigid visionaries'*

| Firm	Firm size	Year of starting the development of the innovation	Number of companies founded before current firm	Field of work	Short description of the innovation
Krho	Micro	2007	none	Civic engagement	Reconnecting the youth with the elderly
Slzd	Small	2009	1	Learning/education	Bottom-up design of national education system
Tise	Micro	2008	1	Economic development	Empowerment of youth for education-, career- & life choices
Wika	Micro	1995	1	Learning/education	Improving the educating & ICT skills of teachers
Lijo	Micro	1994	2≤	Learning/education	Social entrepreneurship education for children
Kolo	Micro	2009	none	Health	Empowerment of elderly in nursing homes
Pake	Micro	2008	none	Human rights	Solution against human trafficking
Erit	Small	2004	none	Civic engagement	Enabling citizens to contribute to NGOs
Moda	Small	2001	none	Learning/education	Educating students global competency skills
Abab	Micro	2005	1	Civic engagement	Law & rights for the disabled
Nemi	Micro	2000	2≤	Civic engagement	Code enabling communication for colour blindness
Rino	Small	2009	none	Civic engagement	Empowerment of marginalised communities
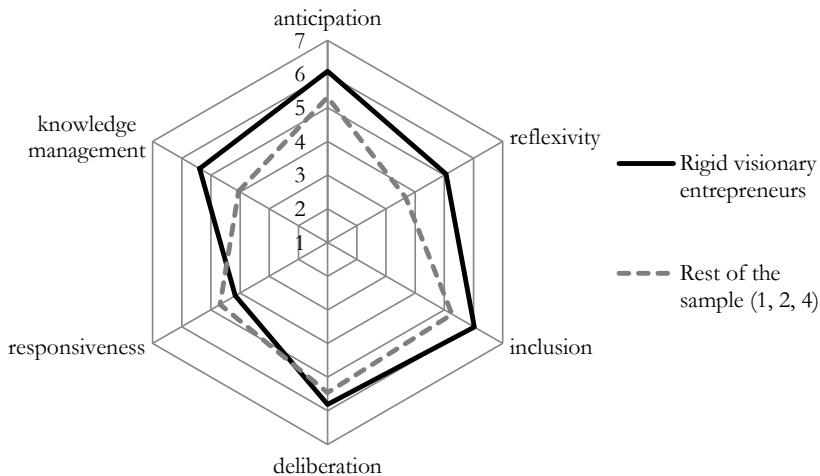
Figure 7. *Radar chart representing the average scores of the 'rigid visionary' entrepreneurs on each of the six dimensions of responsible innovation contrasted with the average scores of the rest of the sample.*

The 'negotiating' visionary social innovators. These social entrepreneurs act as negotiators, as the development of their innovation is the result of the participation of stakeholders, who have actual decision-making power. They engage in most dimensions of responsible innovation but they pay less attention to reflexivity and knowledge management. The social entrepreneurs in this cluster can be considered as visionary entrepreneurs as they score very well on all elements of anticipation and also assess on a quarterly basis whether the innovation activities are actually leading to the desired innovation. The same holds for the frequency of people with different personal and professional backgrounds who share their opinion on the innovation. However, in comparison to the other social entrepreneurs, they rarely reflect on whether their decision-making is still in line with their own norms, values and beliefs.

The negotiating visionary social entrepreneurs have less frequent contact with stakeholders to share their opinion about the innovation, which holds especially true for the community/people affected. However, they are the only social entrepreneurs who have relatively frequent contact with research institutes to receive their insights. Even though the number of occasions where stakeholders share insights is limited, their stakeholder network does provide the right organisational skills, know-how and expertise. Their stakeholders respect each other's roles and are committed to contributing to the innovation. Furthermore, the negotiating entrepreneurs are the only social entrepreneurs who actually share decision-making power with their stakeholders to steer the innovation in the desired direction. These stakeholders can form their opinions based on comprehensive information, and dialogues take place to help address different interests among stakeholders.

Furthermore, it seems that these social enterprises and the stakeholders are mutually responsive in this cluster because the processes and products of their innovations differ from their initial ideas, while at the same time the stakeholders have to adapt to the innovation to allow its implementation. Given that they reflect less on their own norms, values and beliefs, while sharing decision-making power with their stakeholders, it can be concluded that the innovation process and its outcome result from negotiation and co-creation with their stakeholders. Interestingly, even though these social entrepreneurs have relatively frequent contact with research institutes, they are relatively less engaged in acquiring the missing knowledge within the firm or developing knowledge with stakeholders. That said, their staff members often scan for external knowledge that can be internalised.

The profile descriptions of these type of social entrepreneurs were inconclusive in terms of why their processes and outputs differ from what these social entrepreneurs foresee at the start of the innovation process. However, one illustrative case is *Nocl*, who adjusted her focus from creating consumer awareness to changing business operations *"as she discovered that informing consumers would not be enough to change the fishing industry"*. Another illustrative case is *Foha*, who first acted on behalf of the Roma community (to contest their marginalisation). After failing initially, she realised that *"if the Roma were to succeed, it was going to be their self-organization skills and self-respect, which could only be achieved by experiencing change making first hand"*. *Sysu* focused on a single aspect where the disabled faced a lack of opportunities [but] *"as the years*

went by, she realized that her [social enterprise] had a role to play not just in the realm of international exchanges but more broadly in ensuring that [people] with disabilities affected international development agendas". An overview of the characteristics of the 'negotiating' social entrepreneurs and their enterprises, and a description of their innovations can be found in Table 14. The radar chart in 8 is a graphical representation of their scores on every dimension of responsible innovation compared to the mean scores of the other three typologies.

Table 14. *Overview of the social entrepreneurs considered 'negotiating visionaries'*

Firm	Firm size	Year of starting the development of the innovation	Number of companies founded before current firm	Field of work	Short description of the innovation
Sysu	Small	2012	2≤	Human rights	Enabling full participation & leadership of the disabled in (international) development issues
Ogte	Micro	2000	2≤	Learning/education	Introducing alternative forms of preschool education
Nocl	Micro	2001	none	Environment	Research & consultancy for marine life protection
Fikr	Micro	2006	none	Health	Community-based mental health services
Foha	Small	2012	2≤	Human rights	Counselling NGOs of marginalised communities
Kiem	Small	1994	2≤	Civic engagement	Making children active participants in society
Dubr	Micro	1998	1	Environment	System for landscape conservation
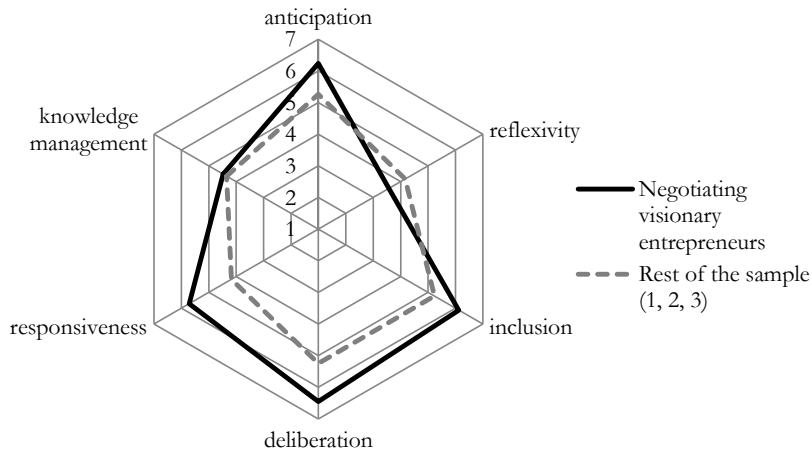
Figure 8. *Radar chart representing the average scores of the 'negotiating visionary' entrepreneurs on each of the six dimensions of responsible innovation contrasted with the average scores of the rest of the sample.*

4.5. Discussion and Conclusion

The aim of this research was to identify different approaches adopted by social entrepreneurs to transform their initial ideas for innovation into final innovation outcomes. There are four different typologies for how social entrepreneurs manage to transform their initial ideas into innovative solutions that (help to) address societal problems. In general, it can be concluded that all four approaches to innovation are at least to some extent based on anticipatory governance of innovation and deliberative forms of stakeholder engagement. This also holds true for the rushing social entrepreneurs who engaged in anticipation, inclusion and deliberation but are less engaged in reflexivity, responsiveness and knowledge management.

The wayfinding social entrepreneurs engage in all dimensions of responsible innovation. However, their actions were less guided by a grand plan nor did they have alternative scenarios in place during the development of their social innovation, which is characteristic of effectuation in contrast to causation (Chandler et al. 2011; Sarasvathy 2001). Furthermore, wayfinding entrepreneurs are adaptive regarding their innovation process and subsequent outcomes, while ensuring that they stay in control of the decision-making during the innovation process. Focusing on adaptiveness and flexibility, while avoiding actions or relations that may lock them in, is one of the coping strategies in effectuation (Fisher 2012). Moreover, the eventual social innovation is different from what they initially foresaw, which is a typical result of applying effectuation in entrepreneurship (Baker & Nelson 2005).

Bricolage is another strategy that can explain the emergence of entrepreneurship (Baker & Nelson 2005; Di Domenico et al. 2010) and social innovation (Goldstein et al. 2010). It can be seen *"as an alternative way to innovation rather than proceeding according to a grand plan"* (Goldstein et al. 2010, p.112), which is often applied in penurious environments (Fisher 2012; Baker & Nelson 2005). This is also the case for the

innovations by wayfinders, who indicate that their stakeholder environment lacks multiple skills to contribute to their development. Although they do not operate according to a grand plan, they are highly reflexive regarding their innovation process, especially reflecting on whether the decision-making is in line with their own norms, values and beliefs. Bricolage revolves around resourcefulness, adaptiveness and recombining resources (Di Domenico et al. 2010; Baker & Nelson 2005). Knowledge sharing is essential in this, as the knowledge itself is recombined and can come from external actors, who might not be in a position to influence decisions (Goldstein et al. 2010). Although the lack of a grand plan seems inconsistent with higher reflexivity, this does not have to be the case. *"Bricolage is an emergent process that, in order to move ahead, needs to amplify weak feedback signals that indicate if the strategy for innovation is on or off target"* (Goldstein et al. 2010, p.112). It thus appears that the wayfinding entrepreneurs experienced a pathway of developmental emergence to vision, characterised as:

> *"a "jigsaw puzzle" and eventually seeing the image emerge from this work as an "epiphany."*
> *The entrepreneurial process of developmental vision begins with an aspiration to make the*
> *world better that seems to be operative through a set of values or beliefs that subsequently*
> *guides conscientious actions in this direction and ultimately results in the shaping of a vision"*
> *(Waddock & Steckler 2016, p.730).*

The rigid visionary social entrepreneurs seem to have a clear plan for addressing a societal problem and make sure to stay close to their own norms and values that guide their decision making. Since they also think of multiple scenarios to implement the innovation, it is fair to say that they engage in causation. They are engaging and deliberating with stakeholders. Yet they make sure that they remain in control of the development of the innovation. Consequently, the development and outcomes of their innovations are similar to their initial ideas. While some social entrepreneurs in this cluster function as illustrative cases, overall the profile descriptions in this cluster were inconclusive as exceptions were encountered as well. However, one reason why these social entrepreneurs might prefer to pursue their own ideas, and aim to stay in control of their innovation, is because social innovation struggles against social and cultural inertia (Goldstein et al. 2010). In that sense, the rigid visionary social entrepreneurs act more like 'social engineers' who *"are usually driven by a missionary zeal and unbounded belief in the righteousness of their causes. Sometimes, it takes this dedication to transform a community or society"* (Zahra et al. 2009, p.529). These social entrepreneurs might be walking the line between engaging with stakeholders to gain social and political legitimacy while making sure that their mission does not meet with resistance. This resistance can come from multiple forces that can be subtle and sometimes difficult to delineate, but are often formed by commonly held socio-cultural norms, conventions, and beliefs that differ from the ones held by the social innovator (Newth & Woods 2014).

The negotiating visionary social entrepreneurs have a clear plan about how to address the societal problem, and have thought of sufficient scenarios to implement the innovation. Hence, the social innovations of negotiating visionaries also appear to emerge from causation. This plan seems to be based

on the principle of developing a solution together with other stakeholders, which may be more important than pursuing their own norms, values and beliefs for the social innovation. Moreover, they are the entrepreneurs who share actual decision-making power with the stakeholders involved. The findings suggest that the negotiating and rigid visionary entrepreneurs are more engaged in a deliberate vision pathway, i.e. a pathway in which visions precede clear intentions and subsequent actions (Waddock & Steckler 2016). However, in contrast to the rigid visionaries, who do not change or refine their visions and subsequent actions, the negotiating entrepreneurs are very responsive, as they ended up with different innovation processes and outcomes from those initially foreseen.

The procedural versus substantive approach to producing underlying norms, values and beliefs for innovation (Pellé 2016) can further help us to understand the results. The procedural approach implies that the underlying norms, values and beliefs that guide the innovation are actually the result of stakeholder deliberation. The procedural approach therefore appears to be closest to the development of social innovation by negotiating social entrepreneurs. The rigid social entrepreneurs, however, adopt a substantive approach, as the underlying norms, values and beliefs that guide the innovation are predetermined. Furthermore, they do not deviate from their planned innovation process nor the envisaged innovation outcome. These differences between social entrepreneurs were also found by Westley et al. (2014), who identified social entrepreneurs that develop and scale their social innovations based on an inclusive and participatory process, whereby stakeholders have a direct voice regarding the social innovation in contrast to social entrepreneurs who develop and scale their social innovations based on their own strong vision. The latter succeeded due to their consistency and drive without compromising their initially chosen vision and priorities (Westley et al. 2014). Table 15 summarises the key similarities and differences between the four identified approaches to develop innovative solutions for societal problems.

Table 15. *Four typologies of governance of innovation by social entrepreneurs*

Dimensions	Type			
	Rushing	Wayfinding	Rigid Visionaries	Negotiating visionaries
Anticipation	The social needs are well understood before determining the desirable solution. Sufficient scenarios are in place to implement the solution	They understand the social needs before determining the desirable solution. However, they stick less to following a plan for development	They follow and stick to their plan as to how to develop the solution for the societal problem. This is determined after they fully understand the social needs to address. Sufficient scenarios are in place to implement the innovation	They follow a plan for development. They fully understand the social needs before determining the desirable innovation outcome, and think of sufficient scenarios to implement the solution
Reflexivity	They work forcefully towards a solution but could better think it through as they do neither reflect on their own norms, values and beliefs nor whether their innovation is on the right track	Their innovation is driven by their own norms, values and beliefs. And people with diverse personal and professional backgrounds share their perspectives on how to develop the innovation.	They are highly reflexive as they reflect whether their decision making is in line with their own norms, values and beliefs. Furthermore, they frequently assess whether their innovation is going in the right direction.	They frequently assess whether the innovation is still going in the desirable direction. However, they do not reflect whether their decision-making is in line with their own norms, values and beliefs.
Stakeholders	Community/people affected Customers/suppliers Experts/consultants	Community/people affected NGOs Customers/suppliers Experts/consultants Other entrepreneurs	Community/people affected NGOs Customers/suppliers Experts/consultants Other entrepreneurs Financiers	Community/people affected NGOs Experts/consultants Research institutes
Stakeholder engagement	The stakeholders were not involved throughout the whole innovation process and do not always house the expertise, know-how and organisational skills to contribute to the innovation	They have a diverse but resource-poor stakeholder network. The stakeholders do not have the commitment, knowledge or organisational skills to contribute to the innovation nor are they involved throughout the innovation process	Well-functioning stakeholder community including representatives. The stakeholders are involved and committed throughout the innovation process and houses the right expertise and organisational skills	Well-functioning stakeholder network including community representatives. The stakeholders are involved and committed throughout the innovation process and houses the right expertise and organisational skills

Table 15. *(continued)*

Dimensions	*Type*			
	Rushing	Wayfinding	Rigid Visionaries	Negotiating visionaries
Deliberation	Transparent innovation process where information is shared with stakeholders. However, relatively few dialogues are organised that help to overcome differences in stakeholder interests. And they are less open to stakeholders regarding their decision making	The innovation process is transparent and activities are organised to encourage dialogue among stakeholders, which help to overcome differences in stakeholders' interests. However, the entrepreneurs make sure that they remain in power with regard to decision-making	The innovation process is transparent and the stakeholders had sufficient information to form their opinion about the innovation. Furthermore, they organise sufficient dialogues to help overcome different stakeholders' interests. However, the stakeholders have relatively little decision-making power	Their participatory innovation process is very transparent. Stakeholders have access to the information necessary to form an opinion about the innovation. Moreover, they have actual decision-making power to guide the innovation in the desirable direction. Dialogues are organised to overcome differences between stakeholders' interests
Responsiveness	Do not deviate from their initial idea as to what the innovation outcome should be. They are capable to adjust the innovation if that was deemed necessary	The entrepreneurs and their stakeholders are mutually responsive as the innovation process and outcome are different from their initial idea; and the stakeholders need to adapt to the innovation to allow its implementation	They do not deviate from their initial plan for development nor the determined innovation outcome. Even though they are capable to adjust the innovation, it are only the stakeholders who adapt to allow implementation of the innovation	Entrepreneurs and stakeholders are mutually responsive to each other as the process and innovation outcome is different from the initial idea. And stakeholders had to adapt to allow implementation of the innovation
Knowledge Management	Creating knowledge within the organisation or with actors beyond their organisation receives negligible attention	They act as bricoleurs as they continuously scan for knowledge, and absorb and/or develop knowledge together with their external stakeholders	Highly engaged in intra-organisational knowledge creation and at the same time developing knowledge together with stakeholders or absorbing it from them	Staff members scan and bring in missing knowledge into the organisation. However, they are less intensively engaged in intra-organisational knowledge creation nor developing knowledge together with stakeholders

The findings of this study were controlled for differences in percentage of income derived from direct sales, previous entrepreneurial experience, the need for economic return on innovation, and uncertainty regarding the future implications of the innovation. Interestingly, there were no significant differences between the four clusters with regard to the control variables. Therefore, additional research could for example look for explanatory variables when or how a market-orientation affects the design of an innovation as is suggested by Newth and Woods (2014).

This study also faces some limitations. First of all, the sample size is relatively small for a cluster analysis and some dimensions have a lower scale reliability. Qualitative comparative analyses (QCA) is proposed as an alternative methodology for samples that are too small for complex quantitative analyses and too large for in-depth qualitative case studies. However, QCA is more suitable when testing relationships between dependent and independent variables and reduces richness of the data as it reduces variables to binary (or in some cases three or four level) data. It is therefore not appropriate for an exploratory study where researchers need to make use of the richness of the data. Nevertheless, it needs to be admitted that future studies in which anticipatory governance and deliberative forms of stakeholder engagement are empirically assessed could benefit from working with larger samples.

Another limitation is the fact that the concept of responsible innovation emerged from a predominantly European discourse, and consequently it is based on liberal democratic values (Wong 2016). Which is why, among other reasons, the research lens of responsible research and innovation cannot be used one-on-one with innovation in the global south (Macnaghten et al. 2014). That is also why the deliberate decision has been made to include only social enterprises in this study that are founded in Europe, United States or Canada. However, this inherently means that results cannot be generalised beyond these geographic boundaries.

The effective response rate is just below 15 percent, however there did not seem to be a self-selection bias with regard to the type of social entrepreneurs nor their innovations. However, there is a lower response rate of social entrepreneurs active in the United States compared to their Canadian and European peers. This could be due to the reputation of Ashoka in the United States, as these social entrepreneurs mentioned that they were being contacted by researchers all too often.

Responsible Innovation by Social Entrepreneurs: an Exploratory Study of Values Integration in Innovations [17]

5.1. Introduction

Responsible innovation is a new and emerging concept that aims to take social and ethical aspects explicitly into account during innovation while balancing economic, social, cultural and environmental aspects. It is a new approach to innovation to develop better novel practices, deliver more societal benefits, better grasp the impacts of technologies, and realise public acceptance (Ribeiro et al. 2016). It is about taking *"care of the future through collective stewardship of science and innovation in the present"* (Stilgoe et al. 2013, p.1570). This is expected to result in more responsible solutions for the grand challenges of our time (Von Schomberg 2011; Wickson & Carew 2014).

As such, responsible innovation has a positive connotation (Bos et al. 2014) and the idea gets foothold in Europe and beyond. The concept focuses predominantly on how to govern science and technological development in a responsible way, thereby focusing primarily on the *development* phase of science and innovation. However, if responsible innovation wants to realise a paradigm shift in society, it needs to be adopted by the business community as well, since companies not only develop innovations but also bring them to the market. That it is crucial to get companies on board becomes clear in an EU funded project *COMPASS,* which specifically aims to provide a business case (i.e. incentives) for high-tech firms to adopt responsible innovation processes. Unfortunately, there are several reasons related to the drivers for responsible innovation, the process itself and the subsequent outcome that make it questionable to implement it in a business context (Blok & Lemmens 2015).

First, grand challenges like climate change are often called 'wicked' because they are complex, ill-structured public problems that are hard to pin down or to solve (Batie 2008). It is then highly questionable how to become responsive to stakeholders when such grand societal challenges act as *inputs* for innovation. Second, responsible innovation presupposes a transparent and interactive innovation *process*. However, transparency and interaction can challenge the information asymmetries on which business opportunities and innovation are based. Hence, such processes can jeopardise the competitive advantage of the firm, and thus its reason of existence. Third, the presupposed mutual responsiveness between stakeholders and shared responsibility for both the innovation process and its marketable products is conflicting with the notion that the investor alone is responsible for the risk-reward assessment and the subsequent investment decision (Blok & Lemmens 2015). Lastly, responsible innovation has a narrow focus on innovation *outputs* as it is

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[17] This chapter is under review for a publication to a peer-reviewed journal

being understood as science and technological development. This excludes other innovation outcomes even though they can have major societal implications as well (Blok & Lemmens 2015; Lubberink et al. 2017b). Furthermore, responsible innovation neglects the crucial stage of implementing the innovation and scaling for impact. This is unfortunate since responsible innovation is not only about innovating with society, but also *for* society (Owen et al. 2012). The business context however focuses on scaling innovations to maximise (social) impact. But this likely creates new managerial challenges, which may challenge the ethical principles that are behind the innovation in the first place (André & Pache 2016).

One of the assumptions in this chapter is that the emerging field of responsible research and innovation can be advanced if it learns from *de facto* responsible innovation practices that are already taking place in a business context. *De facto* responsible innovation is in this research understood as innovation practices and processes that are in line with the current understandings of responsible innovation but they are not initiated with clear frameworks or guidelines for responsible innovation in mind. Learning from *de facto* practices appears to be commonplace in the emerging field of responsible innovation, others learned for example from risk assessment practices (e.g. Chatfield et al. 2017), Corporate Social Responsibility (e.g. Pavie, Scholten, and Carthy 2014) or social- and sustainable innovation (e.g. Lubberink et al. 2017). Ruggiu (2015) champions alternative entrepreneurial forms that may have a disposition to engage in responsible innovation. This brings us to the second assumption in this chapter, which is that social entrepreneurs form a business community where *de facto* responsible innovations are developed, implemented and scaled for impact. There are three main reasons that support this assumption.

First, social entrepreneurs are capable in finding innovative solutions for complex societal challenges while adopting a business logic that focuses on efficiency (Bacq & Janssen 2011; Phillips et al. 2015). Second, social entrepreneurs have the aspiration to innovate for the benefit of society as opposed to pursuing profit or shareholder value like profit-oriented entrepreneurs (Shaw & Carter 2007; Santos 2012). Furthermore, their core values and beliefs are directly related to their actions (Waddock & Steckler 2016). Third, social entrepreneurs often develop social innovations (Phillips et al. 2015) that are not only social in their process but also in their outcomes (Ayob et al. 2016). It is therefore similar to responsible innovation, which is about science and innovation *for* society that takes place *with* society (Owen et al. 2012). Studying *de facto* responsible innovation in a social entrepreneurial context can therefore expand the narrow understanding of innovation being understood as science and technological development.

This chapter therefore aims to obtain a better understanding of *de facto* responsible innovations in the business context of social enterprises. It is based on an exploratory empirical investigation of 42 best practice social entrepreneurs. This research aims to contribute to the literature in the following ways. First, it explores how substantive values for responsible innovation are embedded in the innovation outcomes, and their implications for society. The normative substantive approach is more suitable for the purpose of this study as its focus is more on the 'product dimension' and the value that can be created by including societal values. This approach is for example present in von Schomberg's definition of responsible innovation (Ruggiu 2015), which is the definition that is most often referred to in its field (Burget et al. 2017). Second, this chapter provides empirical informed strategies that social entrepreneurs follow to

implement and scale *de facto* responsible innovations to create more social value. It is important to go beyond the process of developing the innovation and instead focus on its outcomes as well because the final innovation outcomes create social value by solving societal problems or pressing social needs (Phillips et al. 2015). Third, ensuing from the findings in this chapter, the case will be made that the business logic in companies might not only conflict with the current concept of responsible innovation but they may be an opportunity to strengthening the concept instead.

The following section presents the theoretical framework in which the normative substantive approach to responsible innovation is discussed. The second part of the theoretical framework discusses the concept of social entrepreneurship, and the norms, values and beliefs that guide their innovation activities. The materials and methods section explicates what data are analysed in this research, and how they are analysed. The results show how the most encountered normative values are integrated into innovative solutions by social entrepreneurs, and how they are implemented and scaled for impact. The discussion and conclusion of this chapter finishes with the conclusions that can be drawn from the results, and a discussion where we make a case that the conditions in the business context are not only a barrier for responsible innovation, it may also function as an opportunity for the concept of responsible innovation at the same time.

5.2. Theoretical framework

The central idea behind the concept of responsible innovation is to steer innovations into desirable directions, and to make sure that they have the right impacts for society. However, who is in the position to decide what a desirable direction is, or what the right impacts of innovation should be? People have different, sometimes competing values and hold different views about desirable directions and the right impacts of innovation (Von Schomberg 2013). There are two main approaches in the field of responsible innovation that inform how these desirable directions and right impacts can be determined, and thus whether an innovation can be deemed responsible (Ruggiu 2015): the normative approach and the procedural approach[18].

The normative approach is based on (predetermined) substantive values that should be embedded in innovation outcomes and their implications in order to be considered responsible. Hence, it focuses on the outputs of the innovation process, rather than the process itself (Von Schomberg 2013). The procedural approach (Ruggiu 2015) focuses primarily on the process of innovation; it is based on procedural reasoning where the process of responsible innovation should adhere to certain conditions or dimensions (Pellé 2016). It focuses on deliberative forms of stakeholder engagement, who are included at an early stage to establish the values that the innovation outcomes and their implications should respond to (Ruggiu 2015). In other

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[18] As a matter of fact, Ruggiu (2015) uses the term 'socio-empirical' approach, which is actually similar to the procedural approach that for example Pellé (2016) and van Oudheusden (2014) talk about. For consistent use throughout the chapter there is chosen to use the term 'procedural' approach as it is more common in the discourse on responsible innovation.

words, it does not proclaim a predetermined normative view on the innovation outcome nor its implications but predominantly focuses on the 'process dimension' of responsible innovation.

However, these different approaches are not mutually exclusive and combinations can be found within conceptualisations of responsible innovation (Pellé 2016). The definition of responsible innovation by von Schomberg (2013) is illustrative for this, as he argues that the process dimension should be based on transparency and mutual responsiveness among stakeholders, while the product dimension should have the right impacts that follow from predetermined normative substantive values. This chapter focuses on the product dimension of responsible innovations, and therefore builds upon the normative substantive approach where the right impacts of innovations are articulated.

Norms, values and beliefs in responsible innovation

The normative (substantive) approaches focus predominantly on the innovation outcome and their implications (e.g. in van den Hoven et al. (2013) or von Schomberg (2013)) which rely on sets of outcome-oriented norms and values (Pellé 2016; Ruggiu 2015). Those norms and values can act as more practical 'anchors' to steer the innovation in a predetermined desirable direction, or to assess whether innovation outcomes and their implications can be deemed responsible (Pellé 2016). Von Schomberg (2013) argues that there are public values that are already determined and democratically agreed upon. These public values are communicated in the EU Treaty, and they are embedded in the principles, rights and freedoms that are stipulated in the European Union Charter of Fundamental Rights (henceforth EUCFR). These rights, principles and freedoms can be seen as the parameters of the right impacts of innovations.

Based on the treaty and the EUCFR, Von Schomberg argues that innovations should be steered towards (ethical) acceptability, societal desirability and sustainability, which should act as the three normative anchor points for responsible innovation (Von Schomberg 2013). Following from the EU treaty, one could say that innovations and their implications should be *"founded on the values of respect for human dignity, freedom, democracy, equality, the rule of law and respect for human rights, including the rights of persons belonging to minorities"* (European Union 2007, p.11). Furthermore, innovations should be designed with a view to a desirable society, hence *"a society in which pluralism, non-discrimination, tolerance, justice, solidarity and equality between women and men prevail"* (European Union 2007, p.11). Inferring from the EUCFR, one could conclude that innovations and their impacts on society should not conflict, and preferably benefit: social justice, gender equality, solidarity and human rights, quality of life, protection of human health and the environment, sustainable development and a competitive social market economy. Figure 9 shows a graphical overview of these normative anchor points, the public values and the subsequent rights, principles and freedoms.

Von Schomberg	European Treaty	Charter of Fundamental Rights
• Ethical acceptability • Societal desirability • Sustainability	• Human dignity • Freedom • Democracy • Equality • Rule of law • Respect for human rights • including the rights of persons belonging to minorities • Pluralism • Non-discrimination • Tolerance • Justice • Solidarity • Equality between women and men	• Scientific advance • Technological advance • Social justice • Gender equality • Solidarity • Human rights, • Quality of life, • Protection of human health • Protection of environment • Sustainable development • Competitive social market economy

Figure 9. An overview of the right impacts of responsible innovation outcomes and their implications

Ruggiu (2015) connects the focus on normative targets for the product dimension with what can be considered the problem or purpose dimension of responsible innovation. He argues that the grand challenges that are stipulated in the Lund Declaration (e.g. global warming, aging populations or energy supply) refer to societal needs and ambitions, which can therefore also be seen as normative ends for responsible innovation. He further argues that *"the development of entrepreneurial forms that address these needs thus represent an alternative way of increasing productivity and expanding markets through responsible innovation"* (Ruggiu 2015, p.226).

However, the normative approach is not without its caveats. For example, it does not give any guidance when it comes to colliding substantive norms and values; an innovation for enhanced security can for example conflict with privacy. However, this chapter aims explore how substantive norms and values are integrated into innovation outcomes, and provides practical implications. The normative approach is more suitable due to its focus on the product dimension of innovation.

Norms, Values and Beliefs in Social Entrepreneurship

Definitions of social entrepreneurship should logically draw upon entrepreneurial processes that require opportunity exploitation and resource (re)combination processes (Newth & Woods 2014). The following working definition is therefore adopted in this chapter:

> *"Social entrepreneurship is exercised where some person or group: (1) aim(s) at creating social value, either exclusively or at least in some prominent way; (2) show(s) a capacity to recognize and take advantage of opportunities to create that value ("envision"); (3) employ(s) innovation, ranging from outright invention to adapting someone else's novelty, in creating and/or distributing social value; (4) is/are willing to accept an above-average degree of risk in creating and disseminating social value; and (5) is/are unusually resourceful in being relatively undaunted by scarce assets in pursuing their social venture" (Peredo & McLean 2006, p.64).*

Social value can be understood here as the value for society that is generated by solving a societal problem or responding to pressing social needs (Alvord et al. 2004). The value creation process starts with finding a solution for a societal problem or social need. However, value creation is spurred by maximising impact, which requires scaling of innovation (André & Pache 2016). This may be done by 1) diversification, i.e. diversifying the range of products or services 2) scaling across, i.e. disseminating and sharing the innovation with other actors 3) scaling deep, i.e. improving and enriching the current innovation, or 4) scaling up, i.e. reaching new beneficiaries not yet served. Overall, social entrepreneurs have a tendency to develop a sustainable solution for the problem more so than ensuring a sustainable (competitive) advantage for their organisation. Furthermore, they focus more on methods to empower others as opposed to the logic of control that can often be found in commercial companies (Santos 2012).

Social entrepreneurs are emphatic and driven by prosocial motivations and responsibility motives (Stephan & Drencheva 2017; Mair & Noboa 2006). Their values and beliefs play an important role for their enterprise, which is for example reflected in their dedication to create sustainable social impact over (personal) profit. These social logics can compete with market logics and raise ethical challenges (Zahra et al. 2009). However, social entrepreneurs are capable to stay loyal to their own values and beliefs even though they operate in an entrepreneurial setting that is full of dominating market forces (Dey & Steyaert 2016). This is important because their values and beliefs are deeply rooted in the mission of their enterprise (Zahra et al. 2009) and play an important role in their entrepreneurial decision-making (Koe Hwee Nga & Shamuganathan 2010). Visionary social entrepreneurs envision a desirable future state in which a certain societal problem or pressing social need is resolved. These visions are influenced by their own norms, values and beliefs. Not only do they have as such a normative vision, but they also have the capacity to visualise and advance a sustainable solution to reach that desirable future state (Waddock & Steckler 2016). However, 'wayfinding' social entrepreneurs act without having a clear vision yet; they act for example out of moral obligation. The sense making of their actions and subsequent translation into vision follows later. Yet, both

have an internal drive to do something good for society (Waddock & Steckler 2016) and act upon their norms, values and beliefs.

Not only in responsible innovation but also in social entrepreneurship literature the issue is raised that there is no consensus about the common good. There can be contestation as to what is social about the innovation outcomes of social entrepreneurs (Cho 2006). Exactly this 'social' sub-concept is ill-defined in social entrepreneurship literature, and defining it is problematic because establishing the social ends is a political process that is full of values (Choi & Majumdar 2014; Cho 2006). Many social entrepreneurs organise the development of their solutions around values that they consider to be social. This implies that they make claims about their ability and position in society to articulate what is in the interest of the public. This is especially troublesome in cases where this 'social' is contested (Cho 2006) such as the public sector in which social entrepreneurs often operate (Santos 2012), not to mention cases where the values of radical social entrepreneurs differ from the prevailing societal morals and norms (Zahra et al. 2009). For example, *Girls Not Brides* is an organisation committed to end child marriages in countries where this is still tradition. However, Cho (2006) argues that innovations in cases of contestation can only be considered social when they are the result of a public political process; otherwise it is merely the entrepreneur's conception of 'the good' that he or she aims to pursue. The call for a procedural approach in the governance of innovation is therefore not only confined to the field of responsible innovation.

This research can therefore act as a double-edged sword because it delineates what is social about the innovations of social entrepreneurs based on the normative substantive approach in responsible innovation. At the same time, it advances the field of responsible innovation by exploring how the rights, principles and freedoms are integrated into innovations, and it provides strategies for successful implementation and diffusion of responsible innovations in society.

5.3. Materials and methods

The research subjects of this study are 42 social entrepreneurs who are elected as Ashoka fellows.

> *"Ashoka Fellows are visionaries who develop innovative solutions that fundamentally change how society operates. They find what is not working and address the problem by changing the system, spreading the solution, and persuading entire societies to take new leaps. […] social entrepreneurs persist however long the transformation takes. They are creative yet pragmatic, constantly adjusting and changing, with a committed vision that endures until they have succeeded" (Ashoka 2011, p.11).*

Ashoka is a prominent organisation that provides a platform to support their elected fellows. The social entrepreneurs need to go through an exhaustive selection process to become elected. They have to meet five criteria to become elected: they provide a novel solution, show creative problem-solving, portray entrepreneurial quality, have an ethical fibre, and their solution has (potential for) social impact. There are multiple interviews with the entrepreneur and others in their network, as well as site visits, to determine

whether they meet the criteria. The information that is collected throughout this selection process is also shared in a profile description of the entrepreneur, which contains detailed information regarding: the new idea, the problem addressed, the strategies followed, and a biographical summary of the entrepreneur's life.

We approached Ashoka social entrepreneurs to complete a self-assessment questionnaire regarding their innovation process, and conducted content analyses of their profile descriptions which cover their innovation outcomes and implications. In this chapter we concentrate on the latter (i.e. the product dimension), and the results are therefore based on content analyses of their profile descriptions. We contacted social entrepreneurs who operate in Europe, United States or Canada, and who are elected between 2009 and February 2016. We invited them to participate in this project by contacting them via e-mail, sending e-mail reminders, and having follow-up phone calls. In the end, there were 42 social entrepreneurs who completed the self-assessment questionnaire, and therefore the number of profile descriptions that were subject to content analyses totals 42 as well. The sample is confined to these countries because applying the concept of responsible innovation becomes problematic beyond the global north (Wong 2016; Macnaghten et al. 2014).

The average length of a profile description is 2177 words[19] (SD = 515), and they were analysed with Atlas.ti software package that involved both inductive and deductive coding methods. The EU Treaty and EUCFR were used as an initial coding scheme for deductive coding of quotations that indicated whether a certain right, principle or freedom was integrated into an innovative solution, such as the rights of the elderly or non-discrimination (The coding scheme is presented in Table C-1 in Appendix C). During the analyses we observed that social entrepreneurs do not develop a single innovation, instead they provide systems-shaping solutions that consists of several underlying and interrelated innovations (e.g. new financial products, skills-building activities, or medical treatments). These underlying innovations were deductively coded using the coding scheme of social entrepreneurship actions that is developed and tested in Mair, Battilana, and Cardenas (2012, p. 370). Inductive coding took place to map different aspects that shape these innovations or that are shaped by these innovations (e.g. quotes related to scaling of the innovation, piloting/testing the innovation, or accessibility of the innovation). Mair, Battilana, and Cardenas (2012, p. 371) also provide a coding scheme for deductive coding of the principles for justification of the innovation (e.g. enhances efficiency, productivity, creativity, market mechanisms or enhances problem awareness). These coding schemes can be found in their original forms in Appendix C (Table C-2 and Table C-3.

Visual representation of the relationships between the codes were created for each individual case to better understand the relationships between the solutions provided, their implications, and how they relate to the right impacts for innovation. The social entrepreneurs within our sample are heterogeneous with regard to the sectors in which they operate and the solutions provided. After a number of discussions with the researchers, the decision was made to first provide descriptive data of the rights, principles and freedoms behind the values addressed. This subsequently leaves room for a more detailed explanation how

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[19] 2177 words is equivalent to approximately 5.5 pages, Font: Times New Roman, size 12, single line spacing

the most encountered normative substantive values are integrated into the innovation outcomes, and to describe the strategies followed to develop *de facto* responsible innovations. This is done for the most encountered values (and the rights, principles and freedoms that substantiate these values) and the findings are accompanied by exemplary quotes.

5.4. Results

Most of the social entrepreneurs in our sample integrate more than one right, principle or freedom into their innovation. Furthermore, these rights, principles or freedoms can span multiple categories of the EU Treaty and its Charter of Fundamental Rights. In the presentation of the results, HOFR serves as an exemplary case to show how this can be understood in practice.

> *"[HOFR] pioneers a diagnostically superior, personal, low-cost breast examination method by training blind people as skilled diagnosticians. [His] approach integrates them into the primary health care infrastructure, while enhancing women's health care experience and opening an entirely new professional path to a differently-abled constituency."*

The right to preventive health care (categorised under Solidarity in the EUCFR) is integrated into his solution as the entrepreneur proposes a superior, personal and low-cost solution in the form of preventive health care. This solution was initiated in response to deteriorating conditions for early diagnostics in Germany. Moreover, this solution also embeds other rights, principles and freedoms. For example, the right to integration of people with disabilities (categorised under Equality) is integrated as the company works with visually impaired women who perform manual breast examinations. Furthermore, HOFR integrated the right to fair and just working conditions (categorised under Solidarity) as they *"designed a standardized system of orientation for breast examiners based on braille strips. This mapping system is an innovative solution on its own".* This innovative solution therefore integrates multiple rights that are part of two categories of the EUCFR, namely solidarity and equality.

HOFR is among many other social entrepreneurs who integrate a variety of rights, principles and freedoms, which are part of multiple overarching categories. The categories that are most often addressed in the solutions of the social entrepreneurs are: solidarity, freedom and equality. Each of these categories is presented respectively, and tables are provided that show *how* their underlying rights, principles and freedoms are integrated into innovations. Figure 10 shows how often a category is addressed by the social entrepreneurs' solutions.
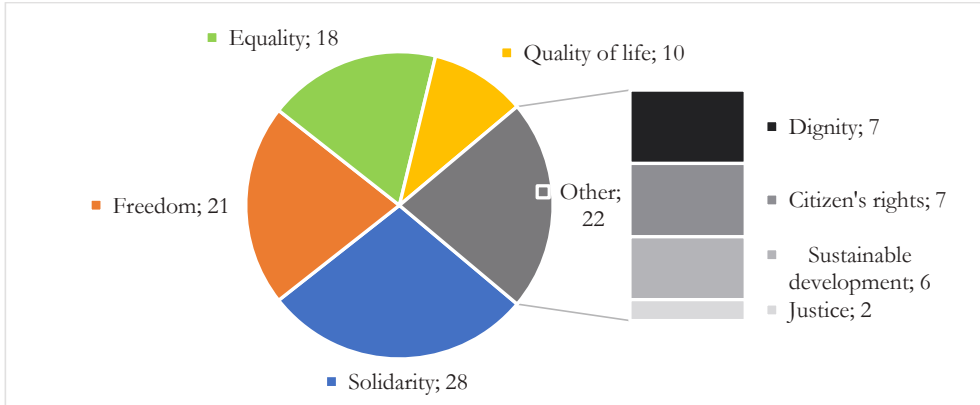
Figure 10. *Occurrence of values embedded in innovations by social entrepreneurs.*

Solidarity

The right that is most often integrated into the solutions of social entrepreneurs is the right to have access to preventive health care, medical treatment and human health protection (n=12). Each social entrepreneur identified a different opportunity to realise their vision to strengthen the right to health care. For example, they aim to improve emergency care for populations in rural areas, they aim for affordable breast examinations or the repurposing of drugs for debilitating and rare diseases. Another frequently encountered right is the right to social security and social assistance (n=7) that is integrated into solutions that for example combat poverty, or provide services to elderly or homeless people who are dependent on others. With regard to family and professional life (n=5), innovative solutions are provided that enhance work-family balance, that provide farming opportunities for families, or that provide income opportunities for underprivileged families. An overview of all rights, principles and freedoms that are part of the category Solidarity can be found in Figure 11.
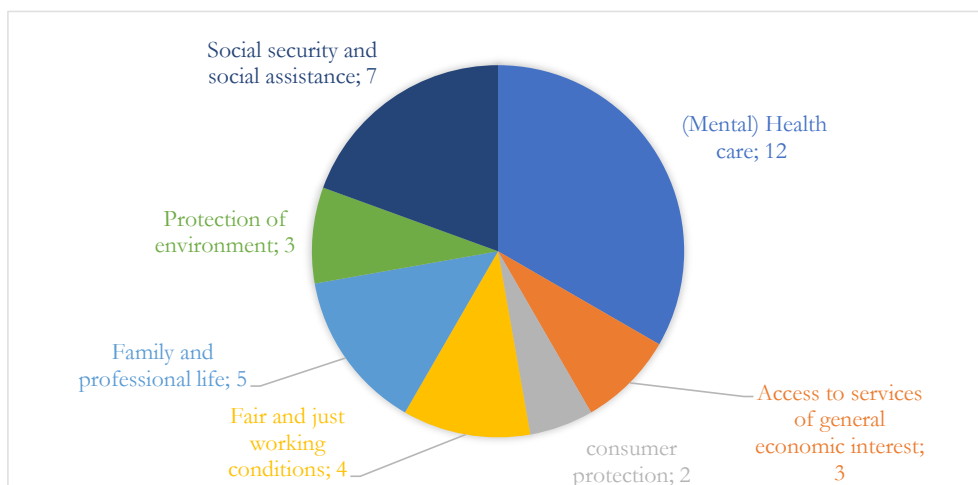
Figure 11. *Rights, principles and freedoms that are part of 'Solidarity'.*

None of the social enterprises work in isolation on their solution. They either work with the target beneficiaries or with other stakeholders in the innovation system. They are true networking entrepreneurs as their solution depends upon a large network of stakeholders who often carry responsibility for a part of the solution. For example, the Irish Community Rapid Response (ICRR) is a social enterprise that connects general practitioners, specialists, firemen, and local councils to create communities who together provide emergency care in rural areas. The company is acting as a coordinator and provides them with *"infrastructure development, intensive bespoke training, and communication strategies to ensure that volunteers are organized and enabled to respond to medical emergency calls quickly and succinctly"*. While the ICRR is responsible for its own revenues, each emergency community is responsible for raising theirs (but ICRR helps in coordinating this fundraising) and a university is responsible for scaling the training of personnel. ICRR is therefore an exemplary case of a social enterprise that does not provide the care themselves. Instead they create a stakeholder network around the solution and coordinate it. This is a common strategy among many social enterprises in our sample.

Social entrepreneurs do not only create communities of previously disconnected stakeholders, but they also employ more standardised approaches to empower communities for impact. For example, RINO first develops trust-relationships with the impoverished communities, and aims to develop a movement that is capable to solve their own problems. The services that are provided by RINO (and LEIS too) focus on creating a movement, providing them with the tools to create the necessary change themselves, and to take care of themselves. More detailed descriptions of how KEJO, RINO and LEIS integrate values into their solutions can be found in Table 16.

Table 16. *Overview how the most common rights, principles or freedoms of Solidarity are integrated into innovations*

Right, principle or Freedom addressed	Description how the right, principle or freedom is integrated into innovation
The right health care,	ICRR creates care systems for patients in rural areas, which improves survival rates for time-urgent medical issues and saving lives. […] KEJO is bringing the Emergency Rescue out to the patients [by] building a network of highly trained volunteer emergency medical personnel who can provide near-intensive care level treatment in life threatening circumstances in order to stabilize lives […] [his] model builds a powerful current of community demand, creating local associations that allow rural areas to support their own medical care, fundraise locally, and dramatically improve their own safety in times of emergency.
Social security and assistance	RINO works to break the cycle of chronic entrenched poverty that has devastated rural populations and marginalized communities. Based on a collective community process she transforms the habits, attitudes, practices and understanding of people and institutions who traditionally do not collaborate. Her strategy offers three types of services: crisis management, trainings, and small-scale crafts and work for income generation and self-sustainability.
Family and professional life	LEIS is bringing women and men together to create a new economy, one that values work-life balance and diverse management practices, and thus reinvents what it means to be successful at work and in the home. She identifies and empowers role models and champions [to] pursue corporate culture change and to legitimise them within their own companies. By recruiting and giving tools to a broad-based network of professional women, [LEIS] exponentially grows the number of female middle managers who have the tools, networks, and self-confidence to change their self-image and promote their own style of leadership.

Freedom

The right to education is most often integrated into the solutions developed by the social entrepreneurs (n=8). This involves solutions that enhance access to (proper) education, solutions that improve the education system, or focus on specific competencies that education should develop. The freedom to conduct a business (n=4) is most often integrated into solutions that provide the resources (human, social, and economic capital) to start a business. An overview of all rights, principles and freedoms that are part of Freedom can be found in Figure 12.
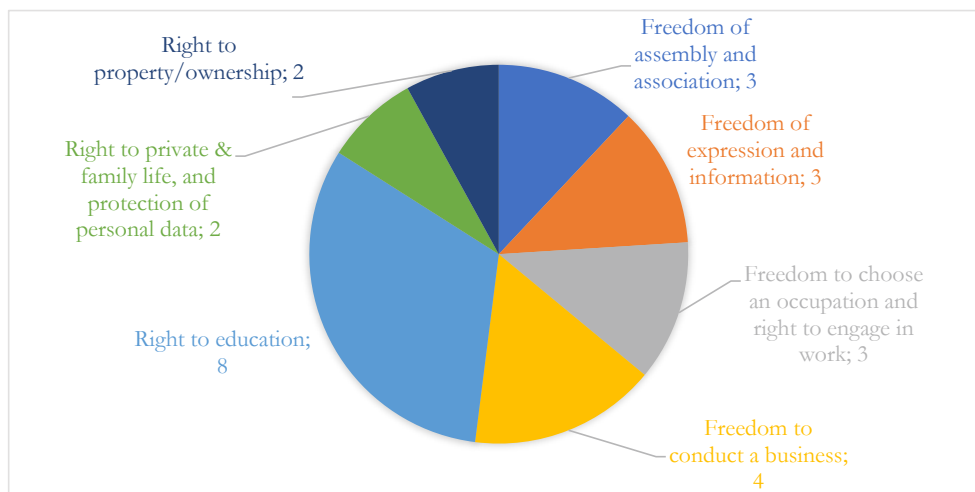
Figure 12. *Rights, principles and freedoms that are subject of 'Freedom'.*

Some of the social enterprises who address challenges related to education (n=8) changed entire education systems, while others integrated missing elements into already existing education curricula. Social enterprises in both cases often develop a network of involved practitioners, and provide training to teachers so they are able to provide quality education. The principles behind their solutions often involve logics of collaboration, either between the different stakeholders involved in education or as in participatory learning for students. Furthermore, their solutions aim to enhance creativity, non-conformity and imagination, which is often achieved by engaging in arts, games and other ways to enhance and exploit their creativity. Their education programs often require commitment of the schools, while the social enterprise often acts as coordinator of the activities.

There are different ways to integrate the freedom to conduct a business into a solution. One way is to act as an incubator and hence provide expertise, finances and a supporting peer-network to help nascent entrepreneurs to start their enterprise. Another way is to focus on institutional change and create legislation for work integration social enterprises (see the case description of DUCH in Table 17). Or to improve the position of insolvent entrepreneurs and strengthening their rights to start an enterprise again (see the case of VOAT in Table 17). Developing a network of peers who can support each other is not confined to this right only, and can also be recognised in case of DRJE, a social entrepreneur who aims to realise freedom of expression and information (see Table 17).

Table 17. *Overview how the most common rights, principles or freedoms of the category Freedom are integrated into innovations*

Right, principle or Freedom addressed	Description how the right, principle or freedom is integrated into the innovation
The right to education	OGTE has transformed the Polish education system by introducing alternative forms of preschool education […] so that every child has equal access to educational facilities and the chance to participate in diverse learning opportunities. [She] has done this by creating flexible and inexpensive community-based programs for children's growth, that respond to the economic situations of rural and provincial areas in Poland.
The freedom to conduct a business	In Germany and throughout Europe, insolvency dooms one's condition financially and also socially. Using the spirit, engagement, and skill of insolvent micro-entrepreneurs in a peer help group, VOAT empowers, destigmatizes and lobbies for insolvent peoples' ability to restart their entrepreneurial lives.
Freedom of expression and information:	DRJE is developing the foundations for professional journalism in […] Central Asia, where independent journalism is constantly under threat, and Central Europe, where there is a strong need for industry standards. This is done by: 1) Creating a space for local reporters to uphold core industry standards while educating them in new media techniques to keep the flame of independent and professional journalism alive in some of the most repressive places. 2) Functioning as a "home" and enabling platform for talented journalists frustrated with state-dominated media or commercial media, empowering them to have much greater impact than they would without support. And 3) raising international awareness around topics that local journalists believe are important and deserve direct action, [neglected] by mainstream media outlets.
Freedom to choose an occupation and right to engage in work	DUCH has introduced a nation-wide approach to connect some of the most excluded people to the labour market by addressing the challenges created by the Swiss government. He demonstrates the power of innovation and experimentation to address social challenges, and builds multi-sector networks across traditional siloes. [This] has resulted in the federation and professionalization of social organizations, the establishment of the social enterprise as a viable structure, and the engagement of all sectors of Swiss society in driving change.

Equality

The principle to recognise cultural, religious, or linguistic diversity (n=7) is often integrated into innovative solutions. For example, FIKR offers mental health care in multiple languages to prevent exclusion of people who or not proficient in the official language. Another interesting example of linguistic diversity comes from NEMI. He developed a code language for colour blind people, and has a normative view that this code becomes as 'mainstream' language like braille (see Table 18). The right to non-discrimination (n=6) is often integrated into solutions that aim to change the public's opinion of marginalised, stigmatised or underprivileged communities (e.g. disabled, minorities, or rural population) accompanied by an aim to empower these communities and include them into society. The right to integration of people with disabilities (n=6) is for example apparent in solutions where disabled people are integrated into work, for

example in work integration social enterprises. An overview of all rights, principles and freedoms that are part of Equality can be found in Figure 13.
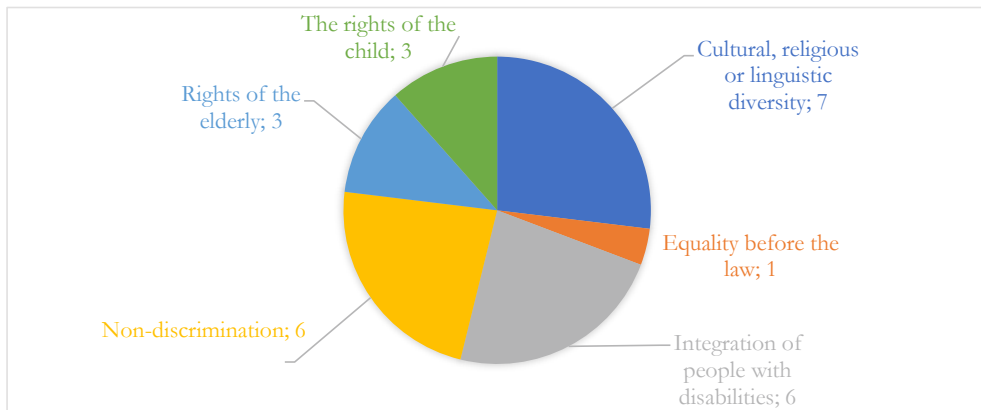
Figure 13. *Rights, principles and freedoms that are subject of 'Equality'*

NEMI is an interesting case as it is one of the few social entrepreneurs who developed a single innovation (i.e. a colour code) and serves as an exemplary case for scaling. Scaling is in this case at least as important as the innovation itself for realising impact. His social enterprise focuses on scaling-out by implementing the colour language in education (since colour is important in textbooks), the health sector (e.g. for drug and pharmaceutical labels) and transport sector (e.g. for orientation signals). Moreover, they focus on scaling-up by designing a national law for implementation of the colour code. Another example comes from MyMind, a social enterprise that is founded by FIKR. MyMind integrates linguistic diversity into their mental health care solution as they provide their care in nine different languages because vulnerable communities often do not speak the official language well.

Three social enterprises respond to human rights issues and their solutions respect the right to non-discrimination, integration of people with disabilities and cultural, religious and linguistic diversity. Their main strategies revolve around creating a network of previously disconnected stakeholders, providing counselling services for these overlooked communities, and changing the opinion that the public holds of these communities. They are also often engaged in policy making and lobbying. All this with the aim to strengthen the position of the marginalised in society.

Right, principle or Freedom addressed	Description how the right, principle or freedom is integrated into the innovation
Respect cultural, religious and linguistic diversity	NEMI has created a code for colour blindness designed with multiple applications. As an augmentative tool, the code substitutes the role of colour in communication. Guided by the motto "Colours for All," ColorADD combines the efficiency of a simple, attractive and scalable method for raising awareness around colour blindness with a dynamic process of implementation that assimilates the users' inputs and needs. The implementation of the code has been developed and piloted with different methodologies and tailored to different industry or sector standards […] to guarantee an effective adoption of the code and allow it to become a mainstream language.
Non-discrimination	FOHA wants to empower Roma communities by developing sustainable solutions for their urgent needs, challenging the negative prejudices forced onto them and actively driving policies and plans that affect their common future. She […] brings together principles of community organizing with Roma culture, helping Roma identify and mobilize around social challenges, develop strategies, leverage resources and organize related stakeholders to launch new interventions, projects and organizations.
Right to integration of people with disabilities	JAAR wanted to: 1) address the dependency of the disabled on state employment centres, 2) the dependency of these centres on government funding, and 3) change the stigma that the centres and the disabled. JAAR is convinced that disabled people need nothing different from what average people need. His organisation built a new system of transactions that exposes the work centres to the market forces in a cooperative way, [thereby] changing the perception of the disabled, and ensuring […] that their products are purchased out of need and desire, not pity.

Synthesis of strategies to develop, implement and scale socio-ethical innovations

Added socio-ethical value. Social entrepreneurs develop solutions for grand challenges that create direct socio-ethical value for the target beneficiaries, which are often vulnerable and marginalised communities in society. The socio-ethical value is created by integrating the rights, principles and freedoms in the innovative solution, in ways that are previously presented. The solutions that create socio-ethical value are a response to a violated right, principle or freedom (e.g. alternative breast examinations in response to the deteriorating right to preventive health care) or they further enhance the created socio-ethical value (e.g. providing mental health care in nine languages).

The solutions that are developed and implemented are systems-shaping solutions that consist of an interconnected set of innovations that influence each other, and interrelate with the larger systems-shaping solution. For example, the systems-shaping solution of HOFR consists among others of a manual breast examination by visually impaired women (process innovation) that is accompanied by braille strips for

coordination (product innovation). Likewise, the ICRR provides emergency care in rural areas which require new medical devices (product innovations) and new approaches to delivering emergency care in rural areas (process innovation).

Another design characteristic that comes with socio-ethical value creation for the target beneficiary is to enhance availability of, or accessibility to, the solution. For example, social entrepreneurs often find ways to integrate affordability and accessibility as a design factor for the solution. MyMind is an exemplary case and wants to make mental health care available to all. They for example engage in price differentiation where people who cannot afford it get mental health care for free or for reduced fees, while the full fee is half of the market rate. They also focus on accessibility as they do not only have face-to-face sessions but also offer online programs. Furthermore, they make sure that the setting is welcoming and discreet, and that it does not appear to be 'medical'. These design characteristics are all developed to break down the barriers to access mental health care.

Bottom-up innovation. The main strategy to create socio-ethical value is by working closely with the target beneficiaries who are stimulated to be involved in the search for a solution. In other words, they are often engaging in grassroots, or bottom-up, innovation processes. This oftentimes leads to empowerment of communities who then play an important role in strengthening their own position in society. For example, in the case of FOHA, "Roma people are co-creating solutions to their mutual problems", and she helps them in identifying problems, organise resources, and developing and following a roadmap for change.

However, the target beneficiary is not the only stakeholder who is often involved in the development or implementation of the solution. For example, teachers are often involved to improve or embed education-related solutions, while local authorities are often involved in community initiatives, and universities are often involved to provide missing knowledge or to assess the impact and validate the solution. Furthermore, other (civil society) organisations are often involved to implement and provide the solution since the social enterprises who initiated the solution are often microenterprises with limited resources. The latter often act as coordinators of collective action in response to a grand challenge.

Radical incrementalism. The solutions and their underlying innovations often result from multiple rounds of iterations. Together with the target beneficiaries and other stakeholders, they pilot, experiment and improve their idea to end up with a final solution that works in a specific setting. It appears to be vital for social entrepreneurs to pilot and validate their solutions (n=17), for example because it provides them more legitimacy to operate. Once they know that their proposed solution works, they often look for strategies to scale. This is for example the case for OGTE who developed a successful "consult, prototype, verify and spread" approach and uses her proven approach for new types of needs.

Learning and innovating to develop a working solution is a necessary but not sufficient condition for creating socio-ethical value. It needs to be complemented with implementation and marketing of the

solution, which is where scaling comes into play. However, it is a balancing act to find out when to stop innovating and start scaling, as both require the allocation of sufficient resources. The innovation can be developed, improved and validated in small community settings, and subsequently it can be scaled for impact. When the right strategies for scaling are applied it can have a profound impact on communities in other settings too, or even for larger societies. The incremental innovations in small community settings can therefore result in radical change in society in this way.

One way to scale the solution is by sharing the idea and encouraging other organisations to replicate the solutions in other settings. This scaling across is a strategy used by HOFR as he "*is spreading the Discovering Hands® method through a newly found non-profit organization to all other German occupational schools, which then will be licensed to instruct MTEs on the standardized training curricula*". NEMI is scaling up by applying the colour code in new areas (e.g. transportation, education, fashion industry) to reach new target beneficiaries, while at the same time he is scaling deep by continuously improving his colour code. The previous example of OGTE who uses her innovative approach for newly identified needs is an example of diversification as a scaling strategy. These strategies for scaling are not only important for the growth of their venture, but more importantly it is maximising social impact and thereby also their socio-ethical value creation. In the end, social entrepreneurs may influence policy making or actually be involved in policy making within their specific field, thereby maximising social impact by sharing their expertise.

Engaging institutional support.   However, not all solutions are only the result of bottom-up processes. There are also successful ways of top-down approaches, or a combination of the two. This is evident from the fact that a large share of social entrepreneurs is engaged in policy making and lobbying activities as well (n=15). For example, DUCH was involved in policy making and legislation to achieve a legal form of social enterprises in his country, with a specific focus on work-integration social enterprises. Sometimes social entrepreneurs are invited to participate in policy making as they gained legitimacy through their work and became experts with regard to the social problem that they address. Oftentimes, these are problems that the government for example did not recognise or failed to (properly) address. Another strategy for systemic change is to engage in public communication activities to inform the public, or other key actors, about the urgency of the social problem or neglected social needs. This to make sure that the social problem gets noticed by important stakeholders, and subsequently creates systems-change. Other ways to gain legitimacy is by strategic partnering with other organisations, operating in transparency, and having third-party validation of the solution.

Overall, social entrepreneurs often create socio-ethical values for their target beneficiaries that requires the involvement of a wide variety of stakeholders, who engage in collective coordinated action. These bottom-up innovative approaches often become structured and validated approaches to social change, which are subsequently scaled for impact. In the end, this is often combined with higher-level institutional support either because the social entrepreneur is invited to participate in policy making, or by lobbying and media activities of the social entrepreneur.

Figure 14 is a graphical representation of the interrelated strategies to develop responsible systems-shaping solutions. This often starts at a small scale with an innovation that responds to a neglected social problem or unaddressed pressing needs, which can often be directly linked to a violated right, principle or freedom. Social entrepreneurs integrate these rights, principles and freedoms in their solutions and thereby *create direct socio-ethical value* for their target beneficiaries. The development and implementation of their solution often requires the *involvement of a wide variety of stakeholders* who engage in coordinated collective action. Subsequently, the final solution crystallises when pilots have taken place, and the impact of the solution is validated. This is followed by multiple strategies for scaling that are vital for enhancing socio-ethical value. In other words, they engage in *radical incrementalism*. Ultimately, social entrepreneurs act as change agents in society as they are often lobbying or taking part in policy making activities to develop *supportive institutional change*. These four interrelated layers of strategies can therefore be seen as an integrated approach of responsible innovation in a business setting, based on a synthesis of the cases in which different activities were performed.
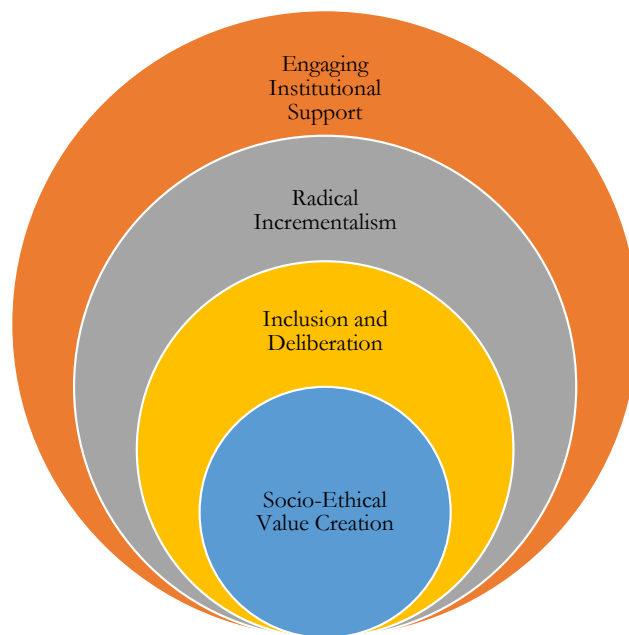

Figure 14. *From bottom-up innovation to scaling systems-shaping solutions*

5.5. Conclusions and discussion

This chapter aims to obtain a better understanding of *de facto* responsible innovation in the business community of social enterprises, and explores how substantive values for responsible innovation are embedded in the product dimension of innovations. Additionally, empirical informed strategies are proposed to develop, implement and scale *de facto* responsible innovations in a business context. The conclusion can be drawn that social entrepreneurs integrate multiple rights, principles and freedoms that cover multiple categories within the EUCFR. Oftentimes, they address a neglected social problem or pressing social needs that can be directly related to a violated right, principle or freedom. Additionally, they integrate other rights, principles and freedoms as well, and thereby creating even more socio-ethical value for their target beneficiaries.

This chapter proposes a new approach to responsible innovation in a business context based on a synthesis of empirically informed strategies. The business logic that is present in social enterprises stresses the importance of implementing and scaling innovation. First of all, because social entrepreneurs often have a disposition to identify an opportunity for creating socio-ethical value directly for the target beneficiary. Socio-ethical value is created by providing solutions for social problems or pressing social needs while integrating important rights, principles and freedoms. Second of all, social entrepreneurs often break down barriers to adopt the innovation, for example by price differentiation based on income or by providing the solution in multiple languages. Third of all, social entrepreneurs coordinate collective action of a wide variety of stakeholders who are gathered around their vision. This stakeholder inclusion is not only important for the development of the innovation, but also for its implementation and subsequent scaling. The focus on implementing innovation that is present in business logics can therefore be an added value for the current notion of responsible innovation that focuses predominantly on stakeholder engagement and deliberation during the development of innovation (e.g. Stilgoe, Owen, and Macnaghten (2013)).

Subsequently, the small scale, bottom-up solutions of social enterprises are often validated before scaling takes place. This strategy can be related to the idea of radical incrementalism, which is here understood as focused evaluation of new small-scale incremental solutions that can subsequently be strategically scaled for generating large societal impact. For example, Goldstein, Hazy, and Silberstang (2010) also found that social entrepreneurs who first operate on a small scale, develop solutions that have a profound impact on the society in the future. The model is completed with the search for institutional support, which is achieved by lobbying for institutional change or when social entrepreneurs become involved in policy making. Social entrepreneurs can act as signalling actors in society as they may alert members of society of the neglected social problem that they address, and the effective solutions that exist (Santos 2012). Responsible innovation is not only about innovating with society but also for society (Owen et al. 2012). However, value for society is only created when innovation is implemented, and value creation is boosted with the scaling of innovation. The synthesis of strategies to develop, implement and scale responsible innovations in a business context can therefore serve as an opportunity to advance the current notion of responsible innovation.

It needs to be acknowledged that bringing innovation to the market and scaling for impact are positively portrayed in this chapter, and these are indeed crucial stages for creating socio-ethical value, besides the development of the innovation itself. However, scaling innovative solutions is not inherently good, just as innovations in general are not inherently good. Research by André & Pache (2016) showed that scaling social innovation and realising growth of the enterprise can create tensions with the original aim of social enterprises, which is to provide care. However, such tensions within the firm may lead for example to mission drift, i.e. moving away from the core mission of the firm. However, scaling may not only be a source of tensions for the firm but also for the innovation itself. For example, scaling across means that the innovation is disseminated among other actors who subsequently implement it in new contexts. This raises for example the questions: who is responsible for the consequences of the innovation. And how can one make sure that it will yield similar impacts? HOFR for example chose to license his innovative solution, among others to make sure that other actors cannot deviate from his approach and hence to make sure that the innovation is properly replicated. We therefore suggest to advance the concept of responsible innovation by not only focusing on socio-ethical considerations for the development of innovation, but also to prove its value by informing how implementing and scaling innovation can be done in a responsible manner. This will benefit socio-ethical value creation as it will scale for impact while at the same time it responds to social and ethical tensions that can come with scaling. We argue that this is a vital step for responsible innovation if it wants to live up to its ambition.

The previous sections included the results of this study, and the insights that were obtained from the analyses, which resulted in an empirically informed strategy for responsible innovation in a business context. This is based on profile descriptions of best practice social enterprises, which can be used as a window into human experience (Mair et al. 2012). They are best practice social enterprises because they went through a meticulous selection process. This brings us to the first limitation of this study, which is the representativeness of these well-established social entrepreneurs, and the profile descriptions. Furthermore, Ashoka is a supportive organisation for social entrepreneurship and therefore it cannot be ruled out that the profile descriptions contain a more positive portrayal of social entrepreneurship than it actually is in practice. For example, information with regard to trade-offs that had to be made, conflicting values or other problems are therefore scarcely mentioned. However, the added value of the profile descriptions outweighs its limitations since the aim of this chapter is to identify successful strategies to integrate the values into innovative solutions. Combined with the fact that the case study descriptions are comparable as they have identical structures, it allows us to provide a valid stylisation of strategies to integrate values into solutions. Which is also why Mair, Battilana, and Cardenas (2012) used Ashoka profile descriptions in their research as well, to describe how social entrepreneurs create change for the benefit of society.

The second limitation of this study is the fact that social entrepreneurs do not focus on science practices nor on technological development. Therefore, we cannot assure that the findings of this chapter can be translated directly into trajectories of science and technological development that are often the phenomenon under study in the field of responsible innovation. However, technological solutions are not the panacea of grand challenges (Godin 2015) and other solutions have to be taken into account as well.

The profile descriptions show that social innovations can be an interesting avenue to look for solutions that respond to grand challenges. Furthermore, non-technological innovation can have a profound impact on society as well, both of desirable and detrimental nature. Therefore, responsible innovation should not only be confined to science and technological development, and should broaden its narrow scope of innovation by including other forms of innovation as well, like social innovation. This chapter can thus be considered as one of the first efforts to include other forms of innovation as well, and provides a new approach to develop, implement, and scale responsible innovation based on empirical investigations of business practices.

Chapter 6

Conclusion and Discussion

Societies all over the world face complex grand challenges, for example challenges related to climate-change, ageing populations or increasing socio-economic inequalities (George et al. 2016). Innovation is often considered as a panacea, and therefore also *the* way to develop solutions for such grand challenges. However, innovation is not inherently good (Godin 2015) as they can also come with uncertainties, questions and dilemmas regarding the future impacts and consequences (Stilgoe et al. 2013; Giddens 1999). Responsible innovations aim to take socio-ethical considerations into account already at the start of the innovation process since changes can then still be made. It involves an attempt to include stakeholders and members of the public throughout the innovation process to better foresee and discern how the innovation can benefit society and how negative implications can be prevented (Burget et al. 2017). Such anticipatory governance of innovation, based on deliberative forms of stakeholder engagement, should make sure that the innovation process and its marketable products are ethically acceptable, societally desirable and sustainable (Von Schomberg 2013).

Unfortunately, it is questionable whether this admirable idea of responsible innovation can be implemented in business contexts, especially given our current political and socio-economic system. Challenges for implementing responsible innovation in business contexts appear with regard to the drivers for innovation, the process of innovation itself, and the innovation outcomes and their implications (Blok & Lemmens 2015). This is unfortunate since the business community plays a key role in our societies for developing innovative solutions for grand challenges and they are bringing these to the market (Adams et al. 2016). This PhD thesis therefore aims to come to an empirically informed understanding of responsible innovation that could hold for business contexts in general, and entrepreneurship contexts in particular.

The following section (section 6.1) presents the answers to the four different research questions, followed by the main conclusion. Section 6.2 presents the theoretical implications of the results. This is followed by the limitations of this PhD thesis and possible directions for further research in section 6.3. This chapter ends with recommendations for scientists and social entrepreneurs that are presented in section 6.4.

6.1. Answers to the research questions

Research objective 1:

Responsible innovation is not entirely new and aims to prevent reinvention of the wheel by borrowing approaches and tools developed from technology assessment and Ethical Legal and Social Aspects (ELSA) in science and innovation. However, this PhD thesis focuses on innovation in business contexts but followed a similar line of thought. The aim of Chapter 2 is twofold, first it clarifies the concept of responsible innovation by comparing it with the concepts of social- and sustainable innovation, and second it aims to

learn from these related innovation concepts as they are already diffused and mainstreamed throughout the business community.

Chapter 2 therefore aims to clarify and advance the concept of responsible innovation in a business context by analysing where it is conceptually similar and dissimilar from social innovation and sustainable innovation.

Due to the multiplicity of conceptualisations and definitions that can be found in each of the three innovation concepts, it was more legitimate to base the conceptual analyses predominantly on literature reviews of responsible-, social- and sustainable innovation as opposed to individual (influential) articles.

The conceptual analyses of literature reviews on responsible-, social- and sustainable innovation revealed a few important dissimilarities (see Chapter 2 for similarities). First of all, the current notion of responsible innovation focuses on how to determine the underlying norms and values for innovation, which can be based on the procedural approach that reflects more a deliberative democratic governance of innovation. Or it can be based on (predetermined) normative substantive values for innovation (i.e. the normative approach). However, the literature on social- and sustainable innovation does not suggest deliberative forms of stakeholder engagement to determine values for innovation. Furthermore, there are multiple reasons why a deliberative democratic governance of innovation is highly unlikely in a business context. The conclusion can therefore be drawn that ethics do play an important role for responsible innovation (in business contexts as well) but a deliberative democratic governance of innovation may not be the way to integrate ethics into innovations. Second of all, the current notion of responsible innovation is unique in its aim to be responsive to the inherent complexities and uncertainties that innovations can have negative implications which is what distinguishes anticipation from mere prediction (e.g. Stilgoe et al. (2013)). Second-order reflexivity is another unique characteristic of responsible innovation. However, the literature reviews suggest that the value systems and beliefs of the managerial board have a profound impact on the development of social- and sustainable innovations. Therefore, second-order reflexivity should be retained for the concept of responsible innovation in business contexts.

The findings in Chapter 2 also reveal that responsible innovation is conceptually overlapping with social- and sustainable innovation on multiple aspects related to the input, throughput and output of innovation. For example, all three innovation concepts are about innovations that respond to grand challenges, and suggest to enhance social and/or environmental well-being in addition to economic returns. Furthermore, social innovation is informative for finding out how to be responsive to the needs of target beneficiaries and how to co-create with them. Sustainable innovation is informative for developing system-changing solutions that respond to grand challenges, while taking the social-, environmental- and economic considerations into account. Because of the conceptual similarities and the fact that social- and sustainable innovation are more practice-oriented and embedded in business contexts, they can function as points of departure for understanding responsible innovation in business contexts, thereby preventing reinvention of the wheel.

There are two important preconditions for the concept of responsible innovation in the business context, which are derived from the conceptual analyses of responsible-, social- and sustainable innovation. First of all, firms need to consider themselves part of society and not apart from it, and they need to embrace the notion of responsible innovation and make it part of the company culture. Social- and sustainable innovation can inform how this could be achieved at strategic and operational level. Second of all, responsible innovations respond to grand challenges that often require complex systems-shaping solutions. These solutions require collaboration among larger networks of stakeholders and organisations, which can only be effective if it is coupled with proper internal knowledge management. It is clear that engaging in responsible innovation requires multiple changes for the firm, and can therefore better be approached as a learning process for the company. On the one hand, this may be more easily done by new ventures. However, incumbent firms may choose to create space to experiment with the new approach to responsible innovation besides their existing business model. This allows firms to adjust the knowledge management processes without risking their business model, while at the same time developing an effective management approach that integrates foresight and novel collaborations with stakeholders.

Research objective 2:

The purpose of Chapter 3 is to identify innovation practices and processes that can help to implement responsible innovation in business contexts, given the current political and socio-economic system. Chapter 2 showed that responsible innovation shares multiple conceptual similarities with social- and sustainable innovation, while the observed dissimilarities are at the same time opportunities to strengthen the concept of responsible innovation in business contexts. Moreover, social- and sustainable innovation are already diffused throughout the business community and have a larger body of scientific literature.

The purpose of Chapter 3 is therefore met by a systematic literature review to identify, analyse and synthesise findings in empirical studies that reported social-, sustainable- and responsible innovation in business contexts.

The procedural framework for responsible innovation by Stilgoe et al. (2013) was used as an initial architecture to analyse the empirical articles. In other words, Chapter 3 focuses on the process dimension of responsible innovations in a business context. In the end, there were 72 empirical studies that passed the quality appraisal and that were subsequently included for the synthesis. The synthesis resulted in a refined framework for responsible innovation in a business context.

This refined framework includes an overview of empirically informed innovation practices and processes that can enhance the dimensions of responsible innovation: anticipation, reflexivity, inclusion, deliberation, responsiveness and knowledge management. With regard to *anticipation*, the argument can be made that companies are already engaging in systems-thinking for innovation. Furthermore, companies are engaged in understanding the needs of the target beneficiary (often the consumer) and discussing with stakeholders how their innovation can be responsive to their needs. The review results with regard to

reflexiveness indicate that organisations engage in several activities to reflect on one's own actions, commitments and assumptions. Furthermore, companies are aware of their knowledge gaps and how to address them. However, there is only limited evidence that they engage in second-order reflexivity, being understood as critically thinking how the underlying value systems and beliefs influence the development of the innovation, both positively and negatively. This is an important observation given that value systems have major implications for the development of the innovation and its future impact. The synthesis also revealed that stakeholder *inclusion* in practice revolves predominantly around engaging with clients and end-users, and people or organisations with professional expertise. The findings also suggest that it is legitimate to differentiate between stakeholder inclusion and stakeholder deliberation. Inclusion focuses more on stakeholder engagement (i.e., which stakeholders to involve and when to involve them), whereas *deliberation* is about creating the right conditions for an open and honest dialogue, which should result in better decision-making during innovation. However, organisations primarily involve stakeholders who share similar values or stakeholders who are motivated to align their interests with a shared objective of the innovation. There were only few reported events where stakeholders with conflicting values, or stakeholders who might oppose the innovation, were involved in the innovation. With regard to *responsiveness,* companies think about how to adjust their innovation to align it with (possible) changes in their external environment. Furthermore, we see that companies collaborate especially with partner firms to develop innovations, and recalibrate their roles to maintain workable relationships for innovation. Last but not least, also the results of this systematic literature review stress the importance of '*knowledge management'* when innovating for society and with society. These activities specifically focus on practical knowledge gaps that innovators face, which they resolve by creating new knowledge in-house and disseminating this throughout their firm, or they involve other organisations to develop knowledge or share knowledge and insights with them.

The systematic literature review in Chapter 3 builds on an existing, and gradually increasing, stream of research on responsible innovation, and proposes an adjusted framework to examine the activities for responsible innovation in the business context. With evidence coming from a diverse body of literature, it gives practical substance to the initial framework proposed by Stilgoe et al. (2013). The upcoming concept responsible innovation does not only ask for new corporate practice in terms of innovation activities, but it also requires that companies reflect on their business models, leadership, and their roles and responsibilities for the political and socioeconomic system in which they operate. The systematic literature review in Chapter 3 can be seen as a first effort to support operationalising of responsible innovation in a business context, and can therefore inform future empirical research that assess to what extent companies implemented responsible innovation dimensions during innovation.

Research objective 3:

Chapter 4 is the first empirical study in this PhD thesis and focuses on the process of developing *de facto* responsible innovations in the business community of social enterprises. It specifically looked into social enterprises because they form a business community where such *de facto* responsible innovation practices are expected to be found.

Chapter 4 aims to identify and describe the different approaches to manage the development of innovations that are present in the field of social entrepreneurship.

The concept of responsible innovation is used here as a theoretical research lens to better understand how social entrepreneurs manage the process of developing their innovations for society. It is based on a self-assessment questionnaire to evaluate to what extent the entrepreneur engaged in the process dimensions of responsible innovation during the development of their innovations. The respondents in Chapter 4 are Ashoka fellows who went through a meticulous selection process, and they can be considered as exemplary change agents in society. In the end, there were 39 respondents who completed the questionnaires that were suitable for further quantitative analyses. First, hierarchical cluster analyses took place to identify clusters of social entrepreneurs based on their innovation processes. Subsequently, non-parametric tests were applied to identify and describe the core characteristics of the innovation process of each cluster. The quantitative analyses were complemented with qualitative content analyses of the profile descriptions of each of these social entrepreneurs, which means that Chapter 4 is based on a mixed methodology study design. The main aim of the qualitative content analyses was to contextualise the results obtained from the quantitative self-assessment.

The results show that there are four different typologies as to how social entrepreneurs manage to transform their initial ideas into innovative solutions (that help) to address societal problems. In general, the conclusion can be drawn that all four approaches to innovation are at least to some extent based on anticipatory governance of innovation and deliberative forms of stakeholder engagement. This also holds for 'rushing' social entrepreneurs who engaged in anticipation, inclusion and deliberation but are less engaged in reflexivity, responsiveness and knowledge management. The 'wayfinders' engage to some extent in all dimensions of responsible innovation, but are relatively less focused on anticipation. They are eager to engage in activities that enhance reflexivity, and to develop knowledge with external actors. The results suggest that they are acting more as bricoleurs by following *"alternative way to innovation rather than proceeding according to a grand plan"* (Goldstein et al. 2010, p.112).

The 'rigid visionary' social entrepreneurs seem to have a clear plan to address a societal problem, which is based on certain norms and values that guide their decision making. Furthermore, they are engaging and deliberating with stakeholders but at the same time they make sure that they remain in control of the development of the innovation. Furthermore, the development and outcomes of their innovations are similar to their initial ideas. The 'negotiating visionary' entrepreneurs also have a clear plan how to address

the societal problem, however the plan seems to be more based on the principle to develop a solution together with other stakeholders. These social entrepreneurs are more engaged in developing a solution together with their stakeholders as these stakeholders had most decision-making power during the development of the innovation compared to the other typologies. Furthermore, the negotiating visionary entrepreneurs are less frequently reflecting whether their decision-making is in line with their own norms, values and beliefs.

The procedural approach to responsible innovation implies that the underlying norms, values and beliefs that guide the innovation are actually the result of stakeholder deliberation. This approach appears to be closest to the governance of innovation by negotiating visionary social entrepreneurs. The rigid visionary social entrepreneurs, however, are more likely to adopt a normative substantive approach as the underlying norms, values and beliefs that guide the innovation are predetermined. Furthermore, they do not deviate from their planned innovation process nor the envisioned innovation outcome.

Research objective 4:

Chapter 5 also aimed to obtain a better understanding of *de facto* responsible innovations in the business context of social enterprises. The objective of Chapter 5 is two-fold:

1. *To explore how social entrepreneurs integrate normative values into their de facto responsible innovations*
2. *To provide empirically informed strategies to develop, implement and scale these innovations*

Following from the normative substantive values that von Schomberg (2013) suggests, it specifically looked into the rights, principles and freedoms that are stipulated in the EU Treaty and its Charter of Fundamental Rights, which are democratically agreed upon. Chapter 5 is based on an empirical investigation of 42 profile descriptions of Ashoka entrepreneurs who can be considered as best-practice social entrepreneurs. These profile descriptions were subject to qualitative content analyses to identify, analyse and synthesise how rights, principles and freedoms are integrated into their innovative solutions for neglected societal problems or pressing social needs. Chapter 5 therefore focuses on the 'product dimension' of responsible innovation, whereas Chapter 4 focused on the innovation process.

The results show that social entrepreneurs are able to integrate multiple rights, principles and freedoms in their innovative solution, which cover multiple categories within the EU Charter of Fundamental Rights (e.g. freedom, health or equality). The social entrepreneurs often integrate a violated right, principle or freedom that can be directly related to the grand challenge that is addressed, and additionally they integrate other rights, principles or freedoms as well. They are able to do so because of their disposition to identify neglected social problems or pressing social needs of oftentimes vulnerable communities, and their drive to respond to it. Their disposition ensues from the fact that they experienced the addressed problem themselves, they were indirectly confronted with it (e.g. via a family member or a friend) or they had relevant experience due to their previous professional career. Not only do social

entrepreneurs integrate right, principles or freedoms in their solutions but they also aim to resolve barriers to innovation adoption. For example, their pricing can be responsive to the income of the target beneficiary, or they provide their solution in multiple languages. Following from the fact that they integrate multiple rights, principles and freedoms in their solutions, and the fact that they remove barriers to adopt the innovation, the conclusion can be drawn that they create direct socio-ethical value for their target beneficiaries.

The results from content analyses reveal that social entrepreneurs coordinate collective action of a wide variety of stakeholders who are gathered around their vision. This stakeholder inclusion is not only important for the development of the innovation, but even so for its implementation and subsequent scaling. The small scale, bottom-up solutions of social enterprises are often first validated before subsequent scaling takes place. This strategy can be related to the idea of radical incrementalism, which is understood here as focused evaluation of new small-scale incremental solutions that can subsequently be strategically scaled for societal impact. The model is completed with the search for institutional support, which can be achieved by lobbying for institutional change or by becoming involved in policy making.

The results in Chapter 5 indicate that ethics do seem to play a role for innovation in social enterprises since all cases either explicitly or implicitly integrated rights, principles or freedoms that underlie normative values. The strategy of social entrepreneurs therefore focuses predominantly on the solution for the target beneficiary. However, this is not the result of continuous deliberation but tends to be a more value driven action resulting from an intent to improve society. The social entrepreneurs identified a social problem and made the decision to act upon it. Their previous experience gives them a disposition to identify the problem and critically think of a solution. Combined with the motivation to develop and implement this solution, and ultimately a vision of a desirable future state, they are developing a solution for the complex problem that they identified. Following the reasoning by Blok, Gremmen, & Wesselink (2016) who focus on sustainability challenges, the conclusion can therefore be drawn that social entrepreneurs are value driven professionals who pioneer a new entrepreneurial forms and innovations for the benefit of society.

Also, the conclusion can be drawn that the business logic in social enterprises stimulates innovation, implementation and scaling for impact. They aim to make sure that there is care provided to their target beneficiaries. Instilling this social business logic into the concept of responsible innovation can be an opportunity for further research as responsible innovation is not only about innovation with society but also innovation for society (Owen et al. 2012). The empirical results indicate that bringing innovation to the market and scaling for impact are equally important to resolve grand challenges.

6.2. Main Conclusions

The current notion of responsible innovation is rapidly gaining ground as a new approach to innovation that responds to grand challenges, while taking socio-ethical considerations into account already during the initial stages of the innovation process. The literature on responsible innovation typically refers to the process of science and technological development that should be guided by foresight, and upstream

inclusion of stakeholders and members of the public who deliberate about the innovation at stake. However, this PhD thesis specifically aims to develop an understanding of responsible innovation that could also hold in business contexts.

Responsible innovation shares multiple similarities with social innovation and sustainable innovation, while their dissimilarities can contribute to the concept of responsible innovation in business contexts. Based on the theoretical and conceptual research in this thesis, it can be concluded that responsible innovation in a business context is driven by grand challenges, such as problems related to climate change, ageing populations or socio-economic inequalities. These are often complex problems that require systems-shaping solutions, which consist of several underlying interrelated innovations. Responsible innovations in business contexts are therefore predominantly a collection of innovations as opposed to a single innovation. Moreover, these underlying interrelated innovations can take multiple forms (e.g. process-, product- or business model innovations). Responsible innovation in a business context therefore has a broader understanding of innovation than the current notion of responsible innovation.

The theoretical research provided few insights about the role of ethics in innovation as opposed to the empirical research that investigated *de facto* responsible innovation in social entrepreneurship. This discrepancy may be due to the fact that the articles in the theoretical part had a different research lens than the one used in this thesis, or that ethics may indeed play an important role for innovation in social entrepreneurship. Even though social enterprises are different from profit-oriented enterprises, the case studies do show that responsible innovations can be developed, implemented and scaled in a business context. The strategies that social entrepreneurs follow to integrate normative values into innovations can stimulate their for-profit peers to integrate ethics in innovation as well. Responsible innovation in a business context (by both social- and profit oriented entrepreneurs) therefore requires strategies to integrate normative values into innovative solutions for grand challenges, and an aim to prevent any violation of the rights, principles or freedoms that are stipulated in the EU Treaty and its Charter of Fundamental Rights (Ruggiu 2015).

Our findings suggest that it does not necessarily require processes of deliberation with a representative network of stakeholders to determine the values for innovation. Companies in general, and new ventures in particular, most likely do not have the resources to engage in such deliberative forms of stakeholder engagement. They work often with limited budgets and have a limited number of employees. The social entrepreneurship cases provide interesting insights how entrepreneurs *can* develop responsible innovation without focusing on deliberative forms of stakeholder engagement to steer an innovation in a desirable direction. The theoretical part and empirical part both stress the importance to engage directly with the target beneficiary. More specifically, it can be concluded from the empirical case studies that responsible innovation in a business context is based on identifying and seizing the opportunity to develop an innovative solution for a grand challenge that benefits the target beneficiary, which are often vulnerable communities in society (e.g. minorities, the elderly, the poor, to name a few). This often involves innovations that protect a right, principle or freedom that is at risk, or strengthens those that are already violated. Moreover, responsible innovations can have more impact for society if there is proactively searched for

ways to remove barriers to innovation adoption, especially barriers experienced by people or communities who need it the most. Responsible innovations in business contexts thus create direct socio-ethical value for their target beneficiaries by integrating rights, principles or freedoms into their solutions and removing barriers to innovation adoption.

Based on the theoretical research and empirical research the conclusion can be drawn that responsible innovations require open innovation processes since the grand challenges require systems-shaping solutions that are unlikely to be developed, implemented and scaled by a single company. Responsible innovations therefore require the involvement of actors beyond the firm in general and target beneficiaries in particular. The case studies show that the company who initiates the responsible innovation is often the coordinator of such collective stakeholder action. However, it is often the entrepreneur who identified the problem and saw an opportunity to resolve it which required entrepreneurship action. During the entrepreneurship process changes can take place in response to certain events, new information or by learning from target beneficiaries, or other organisations involved in collective action. However, some social entrepreneurs are not willing to compromise on their own norms, values and beliefs while others are more responsive to the inputs from others. In the end, that also affects the extent to which the final innovation process and outcome are different from what the entrepreneur had initially foreseen.

Responsible innovation may be presented here as a rigid linear innovation process; however, it should not be interpreted as such since real-life innovations are of more heterogeneous nature. For example, the empirical investigation of *de facto* responsible innovation in social entrepreneurship shows that there are multiple ways for companies to develop innovations for society. This means that responsible innovation in a business context cannot be regarded as a one-size-fits all innovation model to translate initial ideas for innovation into solutions that respond to grand challenges. The concept of responsible innovation should be responsive to influential factors like sector differences, company characteristics, or other factors that could affect the way it is applied in practice.

The process of responsible innovation in business contexts does not finish after the development of an innovative solution. The development needs to be coupled with implementation and subsequent scaling for impact. The development and implementation can be done on a small scale (e.g. community level) where responsible innovations can be developed, piloted and tested for their effectiveness and efficiency. This can be an effective strategy to overcome the dilemma of control (van de Poel 2016), and thus prevent that detrimental implications appear after the innovation is already locked in society. If the innovation appears to have the desirable implications within the small-scale space, it can be subsequently scaled to generate larger scale impact for society. Responsible innovations in a business context can therefore be developed based on the approach of radical incrementalism. The case studies show that this does not depend solely on bottom-up solutions for societal challenges because it can be complemented with top-down approaches for societal change (e.g. lobbying or by participating in policy making).

In the introduction of this PhD thesis there is argued that the business logic may prevent implementation of responsible innovations in a business context. However, the final conclusion that is drawn in this thesis is that it may also provide opportunities for responsible innovation. Business logics

urges one to focus on implementing the innovation and to scale for impact. They therefore form an opportunity for the concept of responsible innovation and to live up to its commitment to not only innovate with society but also about innovation *for* society.

6.3. Theoretical and methodological contributions

6.3.1. Contributions to responsible-, social- and sustainable innovation, and social entrepreneurship.

This PhD thesis has a general contribution to the literature on responsible innovation as it provides a critical perspective on the current notions in responsible innovation based on insights from *de facto* responsible innovation in business contexts and social entrepreneurship context. The first contribution to the literature is that it does not only focus on the process of developing innovations as it also shares insights regarding their implementation and scaling. Innovating *for* society requires that organisations do not only focus on innovation but also focus on implementation and scaling for impact (Seelos & Mair 2017) which receives negligible attention in the field of responsible innovation. The second main contribution of this thesis to the responsible innovation literature is that it champions a broader understanding of 'innovation'. First of all, responsible innovations are not necessarily 'singular' as in an individual innovation. Instead, they are often systems-shaping innovations that consist of several underlying and interrelated innovations. These underlying innovations are not only related to science and technological development but can also take other forms of innovation like process-, service- or business model innovations.

The empirical investigations of *de facto* responsible innovations in social entrepreneurship contexts also provided several contributions to the literature. For example, some findings challenge certain preconditions that are suggested in the current notion of responsible innovation. First of all, the current notion of responsible innovation does not elaborate upon the relative importance of the dimensions of responsible innovation, or which situational factors may affect their importance. Chapter 4 contributes to the literature as it shows the relative importance of the dimensions when social entrepreneurs are innovating for society. Furthermore, it shows how these relative weights can be understood as four typologies. The four different typologies that are presented in Chapter 4 show the heterogeneity among entrepreneurs with regard to their innovation processes, and challenge the necessity of a deliberative democratic governance of innovation when innovating for society. Instead, the findings in this thesis stress the importance that organisations need to co-create direct socio-ethical value for target beneficiaries, which are often vulnerable communities. Furthermore, the empirical chapters show that innovating for society does not necessarily require foresight that is championed in the current notion of responsible innovation. Innovations may result from people or organisations who see a right, principle or freedom being violated and subsequently start to act out of moral obligation without having a clear vision nor the capacity to reach a desirable future state. This implies that organisations may act without foreseeing the future implications of their actions, nor the uncertainties that come with innovation. However there may be situations where not acting upon the problem (i.e. doing 'nothing') is actually doing harm (Lewis 2017).

Von Schomberg (2011, 2012, 2013) argues that the responsible innovation process and the subsequent marketable products should be (ethically) acceptable, societally desirable and sustainable. He derived three normative anchor points from predetermined public values that are democratically agreed upon and that are stipulated in the EU Treaty and its EU Charter of Fundamental Rights (EUCFR). However, it lacks a thorough explanation how the normative anchor points are derived from the EU Treaty and the EUCFR nor how they can be integrated into innovation processes and outcomes. This thesis provides insights how the rights, principles and freedoms of the EUCFR are integrated into innovative solutions that respond to grand challenges. At the same time, it contributes to social entrepreneurship literature as it casts a light on the question: what is 'social' about social entrepreneurship (Cho 2006; Choi & Majumdar 2014). Chapter five shows that social entrepreneurs can be considered social because they are integrating rights, principles and freedoms that are democratically agreed upon into their innovative solutions, while removing barriers for their target beneficiaries to make use of their solutions. On top of that, the findings from the empirical studies provide an argument that the business logic can even be seen as an opportunity to strengthen responsible innovation. It is an opportunity because it would imply that innovators and organisations not only care about the innovation process but also about its implementation and strategies for scaling, with the aim to create more value for society. Another contribution is the proposed synthesised model based on empirical findings, which can refuel research regarding radical incrementalism in responsible innovation. It champions flexibility and piecemeal social experiments as opposed to perfect foresight, which can help to overcome technological lock-in (van de Poel 2016) while its subsequent scaling can still generate large scale societal impact.

This PhD thesis does not only contribute to the field of responsible innovation, but also provides relevant insights for social entrepreneurship, social innovation and sustainable innovation. The conceptual analyses in this thesis helps to 'clarify' the concept of responsible innovation. The findings show how social innovation and responsible innovation relate to each other, which responds to the research agenda raised in a call for papers by the Journal of Product Innovation Management (21 July 2017). The findings also confirm that responsible innovation can indeed be innovations for sustainability as Adams et al. (2016) argue, but contributes by showing where they are dissimilar as well. The insights obtained from empirical research regarding de facto responsible innovation in social enterprises contribute to the field of social entrepreneurship. Even though social entrepreneurship research moved beyond its infancy the sub-concept 'social innovation' is still an understudied but crucial element for social entrepreneurship (Sassmannshausen & Volkmann 2016; Doherty et al. 2014). The insights from this thesis can help to lift the lid off this 'black box' in social entrepreneurship. It provides an alternative for the presumed homogeneity of social entrepreneurship by identifying and describing the heterogeneity of innovation processes.

This section finishes with a methodological contribution that this PhD thesis provides to the research field of responsible innovation. The systematic literature review of empirical articles on responsible-, social- and sustainable innovation in business contexts resulted in a refined framework of responsible innovation, complemented with strategies to implement its underlying dimensions. First of all, this refined framework is a first step for further operationalisation of the concept responsible innovation. This is an

important contribution because the current concept is a 'big word' that has a positive connotation but its contents are flexible and open (Bos et al. 2014), and the underlying dimensions have blurred boundaries between them (Owen et al. 2013). However, this PhD thesis also took a second step by developing a self-assessment questionnaire that aims to measure to what extent organisations engaged in the dimensions of responsible innovation during the development of their innovative solutions. This questionnaire is suitable for large scale data collection for subsequent complex quantitative analyses. Furthermore, the questionnaire is already tested and evaluated in the specific business context of social entrepreneurship, thereby bringing this methodological contribution to further completion.

6.3.2. Theoretical contributions in the light of EU projects on responsible innovation in industry

Responsible-Industry is an EU project that provides a guide to implement responsible technology-based innovation in the industrial context, based on case studies related to ICT for an ageing society (The Responsible-Industry Project Consortium 2017). The main difference is that it focuses on a particular type of innovations (i.e. technologies) and societal challenge (i.e. ageing population). Interestingly, their project found several results that are also encountered in this PhD thesis. Firstly, their insights confirm that the process of responsible innovation should be adaptive to the differences in industry conditions that may inhibit or stimulate its implementation. Secondly, they also conclude that the innovation process should be open and transparent *where feasible*, which is more realistic in the light of information asymmetries. Thirdly, they confirm the importance for companies to engage with end-users (often target beneficiaries) as opposed to engage with all stakeholders, and to enhance access to innovation (e.g. by removing hidden costs). And last, they also conclude that companies themselves are responsible for instilling RRI along their value chain. However, they also provide a few insights that are not found in this thesis but that may indeed foster responsible innovation in a business context. First of all, they suggest to form an ethical monitoring board with independent actors who can help to deal with conflict of interests. This is also suggested in social entrepreneurship literature (e.g. Ebrahim et al. (2014)) but this governance board serves more to prevent mission drift of the enterprise than the governance of innovation. Another recommendation is directed to SMEs with scarce resources, which are suggested to limit their socio-ethical assessment and management only to the early stage of the value chain (e.g. agenda setting and knowledge creation) and combine it later on in the process with performance analyses to increase the safety, quality and acceptability of innovation outcomes. However, this thesis complements the findings of *Responsible Industry* by providing insights based on a wider variety of different innovations, and suggests the notion of systems-shaping solutions. Furthermore, it is based on innovations that respond to a wider variety of societal problems. Finally, it also discusses the implementation and scaling of innovations for impact, and proposes radical incrementalism as a business strategy to deal with the dilemma of control.

The EU project *RRI tools* is initiated to propose an infrastructure that enables to implement responsible research and innovation throughout society (i.e. citizens, policy makers, scientists and the business community). The procedural framework for responsible innovation is also implicitly present in

their discussed responsible innovation process, while the normative anchor points by von Schomberg (2013) should guide the innovation outcomes. RRI-tools focuses on science and technological development but some of their cases are actually non-technological innovations. Where the empirical research in this PhD thesis considers responsible innovation to be different from CSR, in RRI-tools this is more ambiguous. For example, they suggest that companies should balance the triple-bottom-line, to have a gender-balanced board and take care of their customers. Furthermore, they stress the importance of certification, rules and standards. It is therefore different from the social entrepreneurs in this thesis that show the importance of normative and action competences of entrepreneurs that enable them act as virtuous professionals. Rules, regulations and standards are therefore less apparent in the empirical findings of this PhD thesis. Furthermore, RRI-tools suggests to involve stakeholders in an open innovation process to realise innovation outcomes that are ethically acceptable, sustainable and socially desirable. This is different from this PhD thesis, which shows that it is not a necessary condition since some entrepreneurs can have a disposition to address these normative anchor points without opening the innovation process up to all stakeholders.

Compass is an EU project that is still ongoing, which aims among other things to uncover a business case (i.e. incentives) for companies to implement responsible innovation throughout their innovation activities. They also provide empirically informed drivers and barriers to implement responsible innovation in SMEs (deliverable 1.2). Also from the description of their business case studies it becomes clear that companies engage with end-users and stress the importance of creating added value as opposed to advocating a democratic governance of innovation. It therefore relates more to Chapter 5 of this thesis. However, this thesis discusses strategies to control the innovation and *how to* subsequently scale them, whereas deliverable 1.1 of *Compass* only sheds light on which EU projects are initiated to support scaling of innovations. Another main difference is that compass focuses predominantly on technology based innovations related to biomedicine, nanotechnology and cybersecurity.

The *ProGReSS* project provides a deliverable with recommendations from industry and end-users to advance responsible innovation on a global scale. This is based on industry partners and end-users for responsible innovations that involve indigenous populations in South Africa. The focus is therefore on vulnerable communities, just like in this PhD thesis and the elderly population in *Responsible-Industry*. However, it seeks to promote the procedural framework of RRI in the global south which is something that cannot be done one-on-one (Macnaghten et al. 2014). It focuses on policy implications to allow the industry to do RRI in developing countries. In other words, it does not provide insights how firms themselves can engage in responsible innovation. Furthermore, they have a narrow focus with regard to vulnerability as appears from their focus on pro-poor innovation, whereas this PhD thesis provides insights of innovations that target vulnerable people not only related to poverty but also other aspects (e.g. dignity, health, etc.).

This PhD thesis has several contributions that sets it apart from the previously mentioned EU projects. First of all, this PhD thesis aims to separate CSR practices from the development, implementation and scaling of innovation. CSR is more related to the management of the firm in general and its function in society, while responsible innovation refers more the innovation processes, outcomes and their implications. Furthermore, responsible innovations are in this PhD thesis not understood as singular innovations, instead

this thesis argues that they are more likely systems-shaping solutions. Furthermore, in this thesis we may spark a new discussion to consider radical incrementalism as a strategy to overcome the dilemma of control, which is important for responsible innovation. Fortunately, there are also many similarities encountered, especially with *Responsible-Industry*, which indicates that some of the findings based on the social entrepreneurship cases may hold for other industries as well.

6.4. Limitations of this PhD thesis and recommendations for further research

Each of the research chapters in this thesis contains a section that discusses its limitations. This section therefore discusses the overarching limitations of this PhD thesis, and complements these with recommendations for future research. The first main limitation is that there cannot be generalised beyond the 'global north'. This is due to the fact that the concept responsible innovation emerged from a European discourse and is based on liberal democratic values (Wong 2016). Limiting the studies to the global north is a logical consequence but fails to inform what responsible innovation could entail in the 'global south' even though these countries face many grand challenges. The first recommendation for future research is to open responsible innovation up to other philosophies that can shed new light on what 'responsibilities' in responsible innovation can actually entail. Furthermore, these philosophies may provide alternatives for deliberative democratic governance of innovation (Wong 2016) and may therefore be more applicable for responsible innovation in business contexts.

The second limitation of this study relates to the participants in the empirical research. On the one hand, social enterprises form a business community that provide insights to advance the concept of responsible innovation in a business context (see the introduction (Chapter 1) and the empirical studies (Chapter 4 and 5)). But on the other hand, it also comes with a few limitations that need to be taken into account when interpreting the main findings and conclusion of this thesis. First, the social entrepreneurs in our sample are well-established and best practice social entrepreneurs, who are in most cases true change agents in society. However, this is not representative for all types of social entrepreneurs as some engage in more atomistic and incremental activities (Zahra et al. 2009). Second, the social enterprises in our sample are all micro-, small- or medium sized enterprises; they therefore face different opportunities and constraints for innovation than large companies and multinationals. Even though the social entrepreneurship cases show that one *can* engage in more responsible innovation in a business context, this does not mean that the empirically informed strategies can be implemented one-on-one in large enterprises not to mention multinational organisations. Future research regarding responsible innovation could therefore investigate to what extent responsible innovation processes may differ with the size of the firm. Similarly, future social entrepreneurship research could investigate whether, and if so how, the governance of innovation for small social enterprises is different from incumbent benefit corporations such as *Patagonia* or *Kickstarter*. Third and last, the social enterprises in our sample developed and implemented few technology-based innovations, and the results can therefore not be generalised to medium- or high-tech companies. Future research could investigate whether and how differences exist between low-and high tech social enterprises. Sustainable

enterprises are an interesting business community to be used for case comparisons as they are more likely engaged in technological development for (climate related) grand challenges.

The relatively small sample size is another factor that should be taken into account when interpreting the results from the empirical investigation of the 'process dimension' of *de facto* responsible innovation (Chapter 4). Great efforts have been made to persuade Ashoka fellows to participate in this study (first contacts via e-mail, e-mail reminders, and follow-up phone calls), nevertheless the small sample for quantitative research needs to be acknowledged. Qualitative Comparative Analysis (QCA) was considered as a technique as it is specifically developed for medium-sized samples. However, the technique was not deemed as suitable for yielding answers for the research question nor did the data allow for QCA. Due to the relatively small sample size, it was not sufficient to look only at the results from quantitative analyses but it required to look at individual cases as well to control and better understand the results. Still, it is recommended to work with larger samples in future research, which would also allow more rigorous testing of the questionnaire that is developed in this PhD thesis.

The last recommendation relates to the questionnaire as well. Responsible innovation implicitly starts with a vision that precedes intention and subsequent action. This bias is therefore also implicitly present in the questionnaire. For example, DAJA commented on the questionnaire that *"some of these questions did not seem relevant to my work which was much more instinctive and unplanned especially in the early days".* Another entrepreneur praised that the questionnaire was concise but argued that it may fail to capture the differences that exist between innovation processes. Chapter 4 shows that still differences were identified and described, nevertheless it is an element that can contribute to future research. However, BOPA commented that: *"these are good questions. I recently took a traditional 360 evaluation and in many areas had miserable results like I did something wrong - surveys like this understand what makes us tick and how we operate".* These contrasting comments and the fact that action may precede vision in entrepreneurship (Waddock & Steckler 2016) brings me to the following recommendation: empirical research regarding responsible innovation should be able to address the possibility of alternative relationships between vision and action, and be responsive to the heterogeneity of real-life innovation processes.

6.5. Recommendations for policy makers and social entrepreneurs

This PhD thesis aims to advance the concept of responsible innovation in business contexts, and to provide strategies to implement responsible innovation in a business context. The previous sections already shared recommendations for scientists. This thesis finishes with several recommendations for policy makers and social entrepreneurs.

Policy makers

Policy makers are recommended to support social entrepreneurship by providing an infrastructure in which social entrepreneurship can flourish. This should go beyond stimulating only the development of innovative solutions that respond to grand challenges. The findings in this thesis indicate that it is equally important to

provide an infrastructure that stimulates the scaling of innovations that are proven to be efficient and effective in solving a social problem. This creates more impact for society and at the same time it may prevent that resources are wasted on developing innovative solutions that only have small-scale community effects. Policy makers can get inspiration from BENISI; this is a consortium of organisations that identified social innovations with high potential for impact and provide support services to scale these innovations. However, policy makers should pick up the gauntlet and support innovations that can benefit society and have the potential for large scale impact.

Also, it is recommended for policy makers to work in collaboration with eminent social entrepreneurs. First of all, because social entrepreneurs have signalling function in society by making authorities, civil society and companies aware of neglected social problems and pressing social needs. Furthermore, social entrepreneurs develop innovative solutions for social problems that result from violations of certain rights, principles or freedoms. This implies that there should be a stricter control whether certain activities may endanger or violate rights, principles of freedoms that are democratically agreed upon. This confirms Von Schomberg (2013) who argues that there are already rights, principles and freedoms that innovations should adhere to but that are not enforced in practice. Second of all, there is a considerable number of entrepreneurs in the sample that are involved in policy making because they are considered as experts in tackling particular social problems.

Another recommendation relates to the policy making with regard to the concept of responsible innovation. The concept of responsible innovation is for example integrated in Horizon 2020. However, it does not dedicate special attention to the question how the research may benefit or negatively affect the lives of vulnerable communities in particular. This thesis shows that inclusion of all relevant stakeholders is one way to govern innovation, but the impact of science and innovation on the lives of vulnerable communities receives negligible attention.

Recommendations for social entrepreneurs

The first step to a failed innovation is to never start innovating at all (Seelos & Mair 2017). Adopting the idea of responsible innovation may be daunting for entrepreneurs who are already flooded with tasks and confronted with scarce resources. However, working with the approach of responsible innovation should be done with the mindset that it is a learning process and not a recipe for success. The first recommendation is to look at the EU Treaty and its Charter of Fundamental Rights that can be used as a 'moral compass' for developing innovative solutions. It provides insights regarding a whole variety of aspects that the initial idea for innovation may (potentially) conflict with or that it may strengthen. The second recommendation is to allocate sufficient resources to scale innovation, which tends to be overlooked in times where developing novel innovations receives most attention.

Social entrepreneurship has a positive connotation, and social entrepreneurs are indeed characterised by prosocial motives and empathise with their target beneficiaries (Stephan & Drencheva 2017). However, social entrepreneurs often have a vision of what *they* consider to be desirable future states.

Following from the current notion of responsible innovation, the recommendation is to reflect whether the approach taken is the best approach to solve the social problem or to respond to pressing social needs. This may hold especially true for social entrepreneurs who may feel a moral obligation to act upon problems that are experienced by communities with different social, cultural and historical backgrounds. These social entrepreneurs should critically reflect how their personal background may affect their understanding of the problem and subsequent search for a solution. Reflexivity and continuous learning throughout the innovation process are especially crucial for developing responsible solutions in these situations.

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Appendices

Figure A-1. Representation of the search strings that encompass a variety of keywords in combination with Boolean operators

Title/abs/key **business context**		Title/abs/key **responsible**		**innovation**		Title **innovation or business context related words in title**
business* corporat* factory factories workfloor? firm? partnership? ventur* establishment? compan* enterpris* conglomerat* sme* multinational?	*AND*	responsib* rightful* ethic*	*within three words of:*	innovati* progress advancement? enhancement? solution? improvement? novelt* modification? alteration? newness	*AND TITLE CONTAINS ANY OF THE WORDS*	business* OR corporat* OR factory factories OR workfloo* OR firm firms OR organization OR venture ventures OR establishment OR establishments company OR compan* OR enterprise enterprises OR sme OR smes innovati* OR progress OR advancement? enhancement? OR solution? OR improvement? novelt* OR modification? OR alteration? newness

Title/abs/key **business context**		Title **sustainable**		**innovation**		**innovation or business context related words in title**
business* corporat* factory factories workfloor? firm? partnership? ventur* establishment? compan* enterpris* conglomerat* sme* multinational?	*AND TITLE CONTAINS ANY OF THE WORDS*	sustainable eco ecological "people planet profit" "3 P" "three P" "triple bottom line"	*within three words of:*	innovati* progress advancement? enhancement? solution? improvement? novelt* modification? alteration? newness	*AND*	business* OR corporat* OR factory factories OR workfloo* OR firm firms OR organization OR venture ventures OR establishment OR establishments company OR compan* OR enterprise enterprises OR sme OR smes innovati* OR progress OR advancement? enhancement? OR solution? OR improvement? novelt* OR modification? OR alteration? newness

Title/abs/key **business context**		Title **social**		**innovation**		**innovation or business context related words in title**
business* corporat* factory factories workfloor? firm? partnership? ventur* establishment? compan* enterpris* conglomerat* sme* multinational?	*AND TITLE CONTAINS ANY OF THE WORDS*	social collective shared grassroots societal community civil	*within three words of:*	innovati* progress advancement? enhancement? solution? improvement? novelt* modification? alteration? newness	*AND*	business* OR corporat* OR factory factories OR workfloo* OR firm firms OR organization OR venture ventures OR establishment OR establishments company OR compan* OR enterprise enterprises OR sme OR smes innovati* OR progress OR advancement? enhancement? OR solution? OR improvement? novelt* OR modification? OR alteration? newness

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All included articles that served as a source for the synthesis of the systematic literature review:

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Questionnaire:

Q1 How many enterprises have you founded before you started to work on your idea described at Ashoka.org?

- o   0
- o   1
- o   2 or more

Q2 in what year did you start the organization that is described at Ashoka.org?

Q3 Approximately, how many staff members were working with you when you were elected as Ashoka fellow?

Q4 Approximately, how many staff members are currently working at the organization?

Q5 In what year did you start working on the initial idea which resulted in the innovation described at Ashoka.org?

Q6 Approximately, what percentage of total income of your organisation is derived from the direct sales of all products and services that your organisation offers?

Q7 Approximately, what percentage of the total income of your organisation is derived from the innovation described at Ashoka.org?

Uncertainty
Q8 *When you started to work on your initial idea(s), how certain were you that you would create an innovation that* [7 points Likert scale (Very uncertain – Very certain)]:

- (Helps to) solve the problem that you address
- Would NOT have any negative consequences for society or the environment
- Societal stakeholders would consider desirable
- Would NOT harm the quality of life of future generations
- Would NOT confront you with any ethical dilemmas

Anticipation
Q9 The following statements are about the activities that were undertaken to come from the initial idea(s) to the final innovation(s). *To what extent do you agree that you (and your colleagues)* [7 points Likert scale (Strongly Disagree – Strongly Agree)]*:

- Obtained a full understanding of the social needs BEFORE determining the desired impact(s) of the innovation
- Followed a plan for development that guided the innovation activities
- Thought of sufficient scenarios to achieve the implementation of the innovation

Reflexivity
Q10 *Please indicate how often the following activities took place during the innovation process* [7 points Likert scale (Every Day – Once per year or less)]*:

- Evaluations assessing whether the innovation activities were actually leading to the desired innovation
- People with different personal and professional backgrounds shared their perspectives how to develop the innovation

- Critical reflections whether or not the decision-making was in agreement with the norms, values and beliefs held by the innovator(s)

"The following questions are asking you about the involvement of stakeholders during the development of your innovation. With stakeholders we mean individuals, groups or organizations, who: can affect the innovation, are affected by the innovation, or think that they are affected by the innovation"

Inclusion

Q11 *Could you indicate, on average, how often the following stakeholders were providing you with their insights regarding the innovation* [7 points Likert scale (Every Day – Once per year or less)]*:*
- Community/people affected
- NGOs
- Customers/ Suppliers
- Governmental actors
- Experts/ Consultants
- Financiers
- Research institutes
- Other entrepreneurs

Q12 The following statements are about this network of stakeholders who were involved in the innovation process and provided you with insights regarding the innovation. *Thinking about this stakeholder network, please indicate to what extent you agree that these stakeholders* [7 points Likert scale (Strongly Disagree – Strongly Agree)]*:*
- Respected each other's roles
- Included representatives of the community affected by the innovation
- Were involved throughout the whole process
- Maintained a high commitment to contribute
- Had the right organizational skills to contribute
- Had the right expertise and know-how to contribute

Deliberation

Q13 The following questions are asking you about the dialogue(s) with the stakeholder network during the innovation process. *Please indicate to what extent you agree with the following statements* [7 points Likert scale (Strongly Disagree – Strongly Agree)]:
- The innovation process was transparent
- The stakeholders had complete information to form their opinion about the innovation
- The stakeholders had the decision-making power to guide the innovation into the desired direction
- Sufficient activities were organized to encourage active dialogue(s) between stakeholders
- The dialogue(s) helped to overcome different stakeholders' interests and worked towards common interests
- The stakeholders could see how the decisions were made
- The stakeholders could see how they influenced the development of the innovation

Responsiveness

Q14 The following questions are about the actual response to new insights coming from your firm or your stakeholders. *Please indicate to what extent you agree with the following statements* [7 points Likert scale (Strongly Disagree – Strongly Agree)]*:*
- The actual innovation process differed from the initial plan

- Sufficient capabilities were present to adjust the innovation if considered necessary during the innovation process
- Adaptation of the stakeholder environment was necessary to implement the innovation
- The actual innovation differed from the initial idea(s)

"During the innovation process, innovators can experience a lack of knowledge with regard to the management of the innovation process, the innovation outcomes or the impact."

Knowledge management
Q 15 *Please indicate how often you engaged in the following activities to obtain the knowledge necessary for developing the innovation* [7 points Likert scale (Every Day – Once Per Year or Less)]:
- Organizing activities to learn, create or share the necessary knowledge
- Developing the necessary knowledge with stakeholders OR absorbing it from them
- Staff members were scanning AND bringing in the necessary knowledge into the organisation

Q16 Do you have any additional comments?

Table B-1. *Intercorrelations among the study's variables*

	Variables					
	1	2	3	4	5	6
1. Anticipation	1.00					
2. Reflexivity	0.12	1.00				
3. Inclusion	0.324*	-0.02	1.00			
4. Deliberation	0.446**	0.07	0.513**	1.00		
5. Responsiveness	0.06	0.14	0.17	0.22	1.00	
6. Knowledge management	0.13	0.593**	0.03	0.26	0.30	1.00

* P < 0.05 (2-tailed) ** P< 0.01 (2-tailed)

Figure B-1. *The average scores of each cluster on the individual items measuring the dimension anticipation*

Figure B-2. *The average scores of each cluster on the individual items measuring the dimension reflexivity*
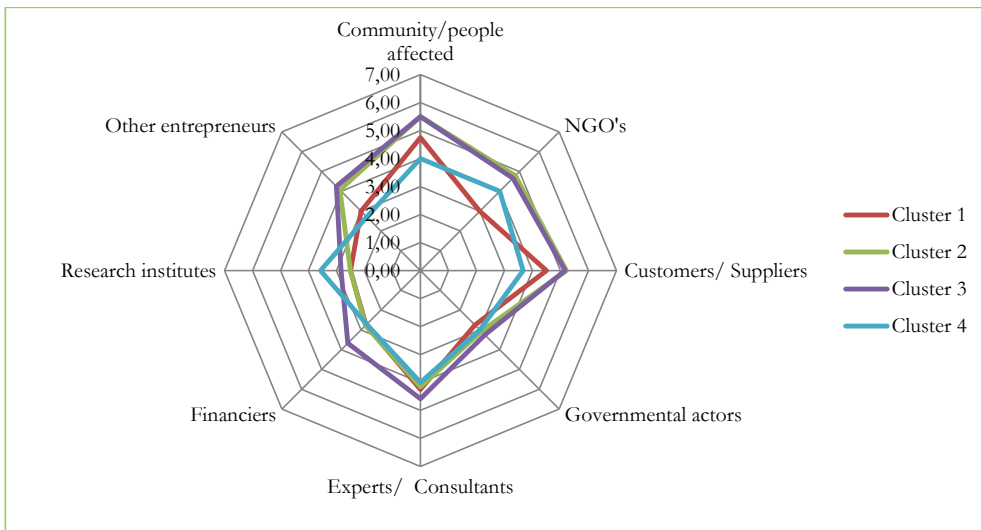
Figure B-3. *The average scores of each cluster how often stakeholder shared their opinions with regard to the innovation at stake*
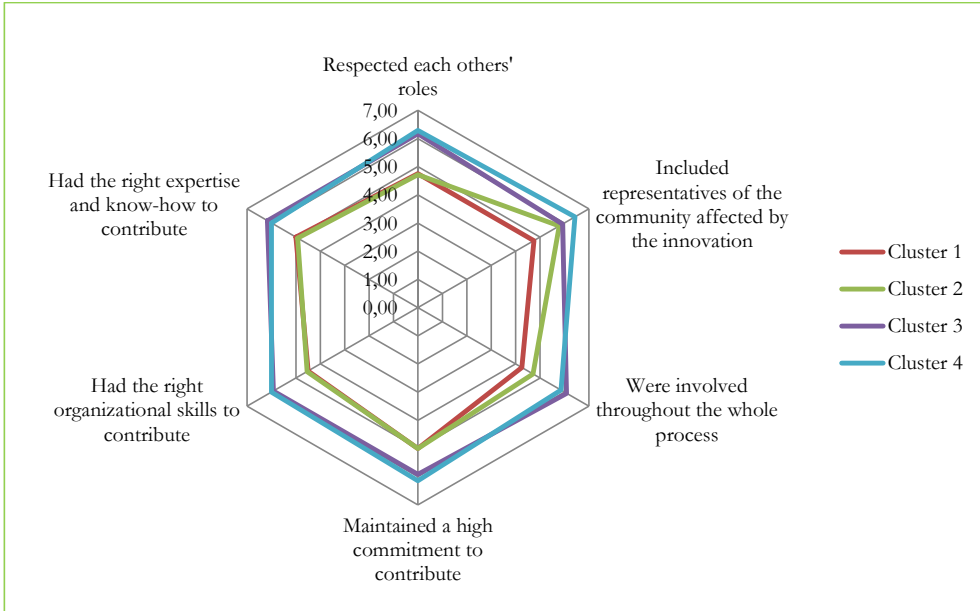
Figure B-4. *The average scores of each cluster on the individual items measuring the dimension inclusion*
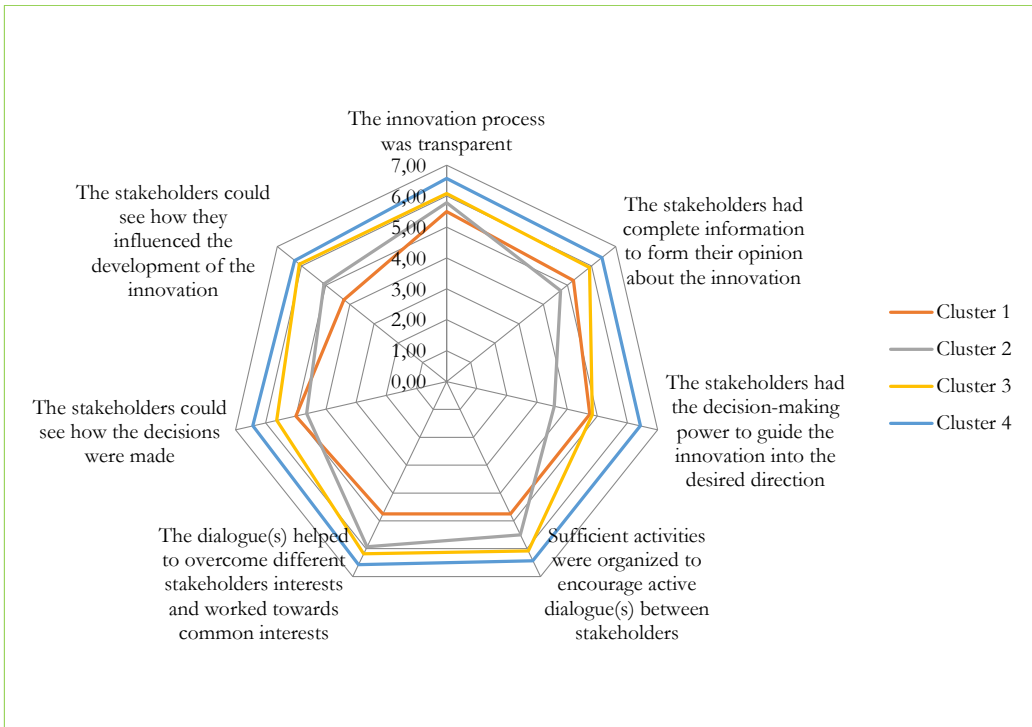
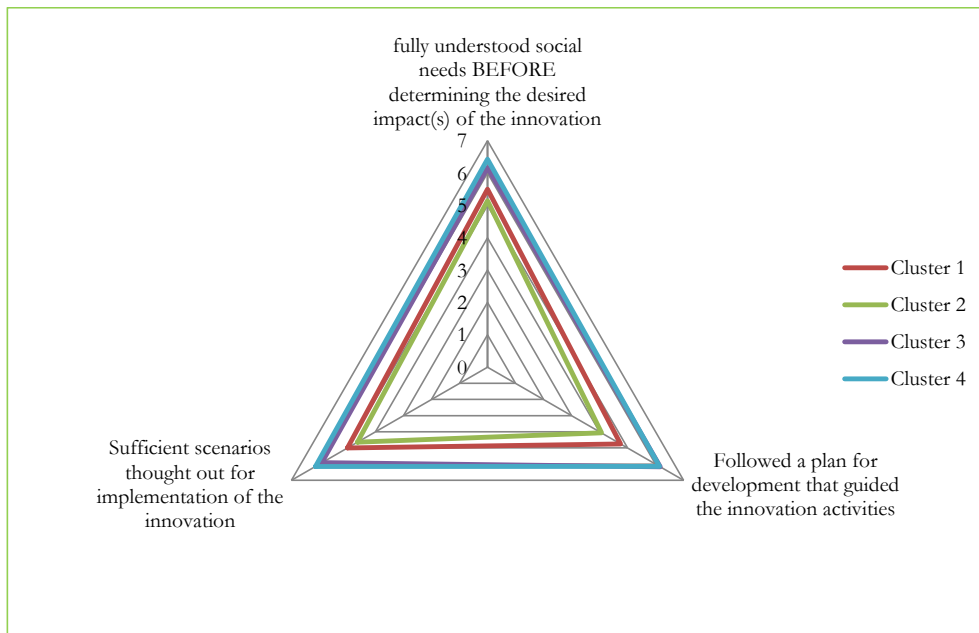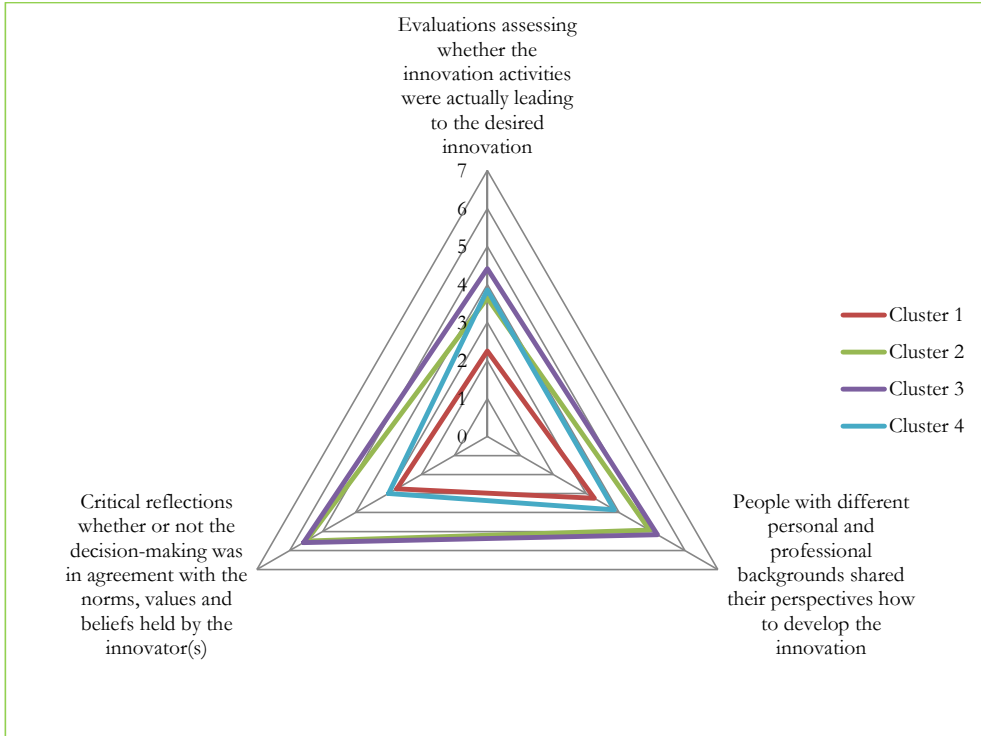**Figure B-5.** *The average scores of each cluster on the individual items measuring the dimension deliberation*
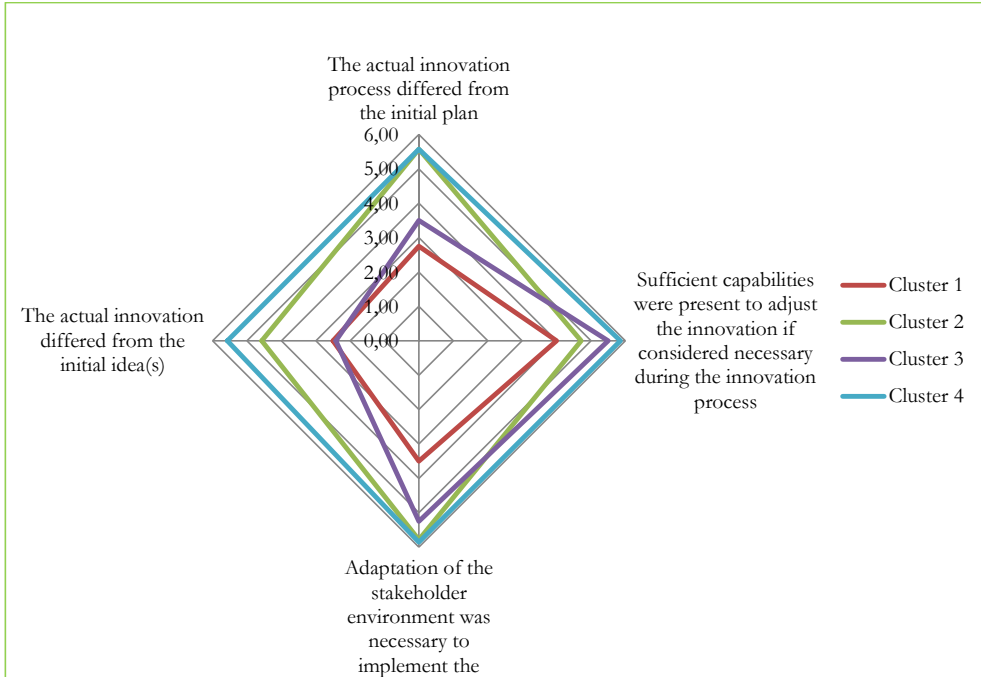
Figure B-6. *The average scores of each cluster on the individual items measuring the dimension responsiveness*
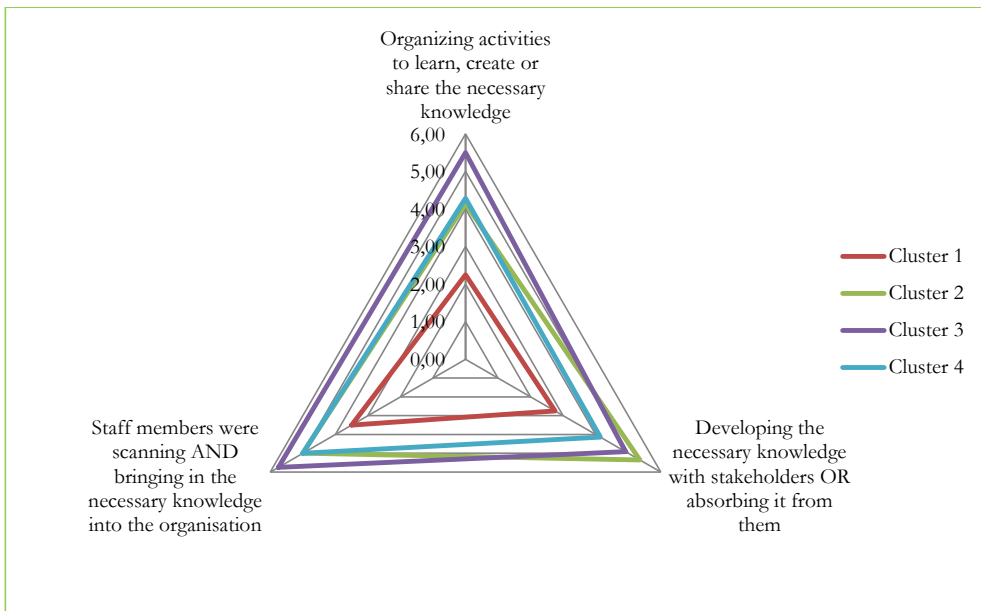
Figure B-7. *The average scores of each cluster on the individual items measuring the dimension knowledge management.*

Overview of discriminating variables

Table B-2. *Overview of discriminating characteristics based on Mann-Whitney U tests comparing cluster 1 with the other three remaining clusters*

	Cluster Medians and interquartile ranges						Sign.
	Cluster 1 (n = 4)			Rest of the Sample (n = 33)			
	Lower quartile	Median	Upper quartile	Lower quartile	Median	Upper quartile	
Evaluations assessing whether the innovation activities were actually leading to the desired innovation	1,25	2,50	3,00	3,00	4,00	5,00	,014
People with different personal and professional backgrounds shared their perspectives how to develop the innovation	2,25	3,50	4,00	4,00	5,00	6,00	,045
Critical reflections whether or not the decision-making was in agreement with the norms, values and beliefs held by the innovator(s)	1,50	3,00	3,75	4,00	6,00	6,00	,010
Included representatives of the community affected by the innovation	4,00	4,50	5,75	5,00	6,00	7,00	,024
Sufficient activities were organized to encourage active dialogue(s) between stakeholders	4,00	4,50	5,75	6,00	6,00	7,00	,035
The dialogue(s) helped to overcome different stakeholders interests and worked towards common interests	3,25	5,00	6,00	5,25	6,00	7,00	,044
The stakeholders could see how they influenced the development of the innovation	4,25	5,00	5,75	4,25	6,00	6,75	,036
The actual innovation process differed from the initial plan	1,25	3,00	4,00	4,00	5,00	6,00	,019
Sufficient capabilities were present to adjust the innovation if considered necessary during the innovation process	3,25	4,00	4,75	5,00	6,00	6,00	,047
Adaptation of the stakeholder environment was necessary to implement the innovation	2,25	3,50	4,75	5,00	6,00	6,00	,005
Organizing activities to learn, create or share the necessary knowledge	1,25	2,50	3,00	4,00	5,00	5,00	,002
Developing the necessary knowledge with stakeholders OR absorbing it from them	2,25	3,00	3,00	4,00	5,00	6,00	,008
Staff members were scanning AND bringing in the necessary knowledge into the organisation	2,50	4,00	4,00	5,00	5,00	6,00	,009
reflexivity	1,92	2,83	3,50	4,00	4,67	5,33	,002
responsiveness	2,31	3,25	4,00	4,00	4,75	5,88	,007
Knowledge management	2,17	3,00	3,33	4,33	5,00	5,67	,000

Table B-3. *Overview of discriminating characteristics based on Mann-Whitney U tests comparing cluster 2 with the other three remaining clusters*

| | Cluster Medians and interquartile ranges | | | | | | Sign. |
| | Cluster 2 (n=14) | | | Rest of the Sample (n = 23) | | | |
	Lower quartile	Median	Upper quartile	Lower quartile	Median	Upper quartile	
Obtained a full understanding of the social needs BEFORE determining the desired impact(s) of the innovation	4,75	5,00	6,00	6,00	6,00	7,00	,009
Followed a plan for development that guided the innovation activities	2,75	5,00	5,00	5,00	6,00	7,00	,000
Thought of sufficient scenarios to achieve the implementation of the innovation	3,75	5,00	6,00	5,00	6,00	6,00	,008
Critical reflections whether or not the decision-making was in agreement with the norms, values and beliefs held by the innovator(s)	4,75	6,00	6,25	3,00	4,00	6,00	,045
Were involved throughout the whole process	3,00	5,00	6,00	5,00	6,00	6,00	,024
Had the right organizational skills to contribute	4,00	4,00	5,00	5,00	6,00	6,00	,002
Had the right expertise and know-how to contribute	4,00	5,00	6,00	5,00	6,00	7,00	,016
The stakeholders had complete information to form their opinion about the innovation	3,75	5,00	6,00	5,00	6,00	7,00	,005
The stakeholders had the decision-making power to guide the innovation into the desired direction	3,00	3,00	4,00	4,00	6,00	6,00	,000
The stakeholders could see how the decisions were made	3,00	4,50	6,25	5,00	6,00	6,25	,028
The stakeholders could see how they influenced the development of the innovation	4,75	5,00	6,00	5,75	6,00	7,00	,044
The actual innovation process differed from the initial plan	5,00	5,50	6,25	2,00	4,00	5,00	,009
Developing the necessary knowledge with stakeholders OR absorbing it from them	4,75	6,00	6,25	3,00	4,00	6,00	,040
anticipation	4,25	4,33	4,92	5,67	6,00	6,00	,000
inclusion	4,13	5,17	5,83	5,33	6,00	6,33	,009
deliberation	4,39	5,07	5,46	5,14	6,00	6,43	,004

Table B-4. Overview of discriminating characteristics based on Mann-Whitney U tests comparing cluster 3 with the other three remaining clusters

| | Cluster Medians and interquartile ranges | | | | | | Sign. |
| | Cluster 3 (n = 12) | | | Rest of the Sample (n = 25) | | | |
	Lower quartile	Median	Upper quartile	Lower quartile	Median	Upper quartile	
Followed a plan for development that guided the innovation activities	6,00	6,00	6,75	3,50	5,00	6,00	,004
Evaluations assessing whether the innovation activities were actually leading to the desired innovation	3,25	4,50	5,75	3,00	3,00	4,00	,047
Were involved throughout the whole process	6,00	6,00	6,75	4,00	6,00	6,00	,013
Had the right organizational skills to contribute	5,00	6,00	6,75	4,00	5,00	6,00	,013
Had the right expertise and know-how to contribute	5,25	6,00	7,00	4,00	6,00	6,00	,045
The actual innovation process differed from the initial plan	2,00	4,00	5,00	4,50	5,00	6,00	,004
The actual innovation differed from the initial idea(s)	1,00	2,00	4,50	3,50	5,00	6,00	,004
Organizing activities to learn, create or share the necessary knowledge	5,00	5,00	6,00	3,00	4,00	5,00	,000
Staff members were scanning AND bringing in the necessary knowledge into the organisation	5,25	6,00	6,00	4,00	5,00	5,50	,010
anticipation	6,00	6,00	6,00	4,33	5,00	6,00	,004
reflexivity	4,08	5,33	5,67	3,17	4,33	5,00	,011
inclusion	5,38	6,00	6,83	4,417	5,67	6,00	,030
responsiveness	3,50	4,00	4,75	4,13	5,25	6,00	,011
Knowledge management	4,75	5,50	6,00	3,83	4,33	5,17	,007

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Table B-5. Overview of discriminating characteristics based on Mann-Whitney U tests comparing cluster 1 with the other three remaining clusters

	Cluster Medians and interquartile ranges						Sign.
	Cluster 4 (n = 7)			Rest of the Sample (n = 30)			
	Lower quartile	Median	Upper quartile	Lower quartile	Median	Upper quartile	
Critical reflections whether or not the decision making was in agreement with the norms, values and beliefs held by the innovator(s)	1,00	4,00	4,00	4,00	6,00	6,00	,003
The stakeholders had complete information to form their opinion about the innovation	6,00	6,00	7,00	4,75	5,50	6,00	,014
The stakeholders had the decision-making power to guide the innovation into the desired direction	6,00	6,00	7,00	3,00	4,00	5,00	,000
The stakeholders could see how the decisions were made	6,00	6,00	7,00	4,00	5,00	6,00	,008
The actual innovation differed from the initial idea(s)	4,00	6,00	7,00	1,00	3,50	5,00	,017
anticipation	5,67	6,00	7,00	4,33	5,50	6,00	,025
reflexivity	2,33	4,00	4,67	3,67	4,67	5,33	,049
inclusion	5,67	6,00	6,50	4,67	5,42	6,00	,041
deliberation	6,00	6,43	7,00	4,85	5,36	5,89	,001
responsiveness	5,25	6,00	6,25	3,88	4,38	5,50	,005

Table B-6. *Overview of discriminating characteristics based on Mann-Whitney U tests comparing cluster 1 with cluster 2*

	clusters						Mann-Whitney U test
	Rigid			Wayfinders			sign.
	lower quartile	median	upper quartile	lower quartile	median	upper quartile	
Critical reflections whether or not the decision-making was in agreement with the norms, values and beliefs held by the innovator(s)	1,5	3	3,75	4,75	6	6,25	,005
The actual innovation process differed from the initial plan	1,25	3	4	5	5,5	6,25	,002
Adaptation of the stakeholder environment was necessary to implement the innovation	2,25	3,5	4,75	5	6	6,25	,007
Developing the necessary knowledge with stakeholders OR absorbing it from them	2,25	3	3	4,75	6	6,25	,008
reflexivity	1,92	2,83	3,5	4,17	4,67	5,08	,002
responsiveness	2,31	3,25	4	4,44	5,125	6	,003
Knowledge management	2,17	3	3,33	4,33	4,5	5,67	,001

Table B-7. *Overview of discriminating characteristics based on Mann-Whitney U tests comparing cluster 1 with cluster 3*

	clusters						Mann-Whitney U test
	Rigid			Rigid visionaries			sign.
	lower quartile	median	upper quartile	lower quartile	median	upper quartile	
Critical reflections whether or not the decision-making was in agreement with the norms, values and beliefs held by the innovator(s)	1,5	3	3,75	5	6	6	,004
Organizing activities to learn, create or share the necessary knowledge	1,25	2,5	3	5	5	6	,001
Staff members were scanning AND bringing in the necessary knowledge into the organisation	2,5	4	4	5,25	6	6	,002
anticipation	4,5	5	5,75	6	6	6	,008
reflexivity	1,92	2,83	3,5	4,08	5,33	5,67	,002
Knowledge management	2,17	3	3,33	4,75	5,5	6	,002

Table B-8. *Overview of discriminating characteristics based on Mann-Whitney U tests comparing cluster 1 with cluster 4*

	clusters						Mann-Whitney U test
	Rigid			negotiating visionaries			sign.
	lower quartile	median	upper quartile	lower quartile	median	upper quartile	
Organizing activities to learn, create or share the necessary knowledge	1,25	2,5	3	4	4	5	,005
deliberation	4,21	5	5,46	6	6,43	7	,008
responsiveness	2,31	3,25	4	5,25	6	6,25	,008

Table B-9. *Overview of discriminating characteristics based on Mann-Whitney U tests comparing cluster 2 with cluster 3*

	clusters						Mann-Whitney U test
	Rigid			negotiating visionaries			sign.
	lower quartile	median	upper quartile	lower quartile	median	upper quartile	
Followed a plan for development that guided the innovation activities	2,75	5	5	6	6	6,75	,000
Were involved throughout the whole process	3	5	6	6	6	6,75	,008
Had the right organizational skills to contribute	4	4	5	5	6	6,75	,002
The actual innovation process differed from the initial plan	5	5,5	6,25	2	4	5	,001
The actual innovation differed from the initial idea(s)	2,75	5	6	1	2	4,5	,006
anticipation	4,25	4,33	4,92	6	6	6	,000
inclusion	4,135	5,17	5,83	5,38	6	6,83	,006
responsiveness	4,44	5,13	6	3,5	4	4,75	,005

Table B-10. Overview of discriminating characteristics based on Mann-Whitney U tests comparing cluster 2 with cluster 4

	clusters						Mann-Whitney U test
	Rigid			negotiating visionaries			sign.
	lower quartile	median	upper quartile	lower quartile	median	upper quartile	
Followed a plan for development that guided the innovation activities	2,75	5	5	5	6	7	,008
Critical reflections whether or not the decision-making was in agreement with the norms, values and beliefs held by the innovator(s)	4,75	6	6,25	1	4	4	,002
Had the right organizational skills to contribute	4	4	5	5	6	7	,007
The stakeholders had complete information to form their opinion about the innovation	3,75	5	6	6	6	7	,006
The stakeholders had the decision-making power to guide the innovation into the desired direction	3	3	4	6	6	7	,000
anticipation	4,25	4,33	4,92	5,67	6	7	,001
inclusion	4,125	5,17	5,83	5,67	6	6,5	,006
deliberation	4,39	5,07	5,46	6	6,43	7	,000

Table B-11. Overview of discriminating characteristics based on Mann-Whitney U tests comparing cluster 3 with cluster 4

| | clusters | | | | | | Mann-Whitney U test sign. |
| | Rigid | | | negotiating visionaries | | | |
	lower quartile	median	upper quartile	lower quartile	median	upper quartile	
Critical reflections whether or not the decision-making was in agreement with the norms, values and beliefs held by the innovator(s)	5	6	6	1	4	4	,002
The stakeholders had the decision-making power to guide the innovation into the desired direction	4	5	6	6	6	7	,008
The actual innovation process differed from the initial plan	2	4	5	5	6	7	,006
The actual innovation differed from the initial idea(s)	1	2	4,5	4	6	7	,002
Organizing activities to learn, create or share the necessary knowledge	5	5	6	4	4	5	,004
responsiveness	3,5	4	4,75	5,25	6	6,25	,001

Table C-1. *The coding scheme that shows the category of the EUCFR, the underlying rights, principles and freedoms, and exemplary quotes that address these rights, principles and freedoms.*

Category	code	Description	Example quotation
	Right to the integrity of the person	1. Everyone has the right to respect for his or her physical and mental integrity.	By fostering social awareness through outreach and advocacy, ABAB seeks to change the traditional stereotypes and social stigmas common in Arab society toward the blind.
			Through his MyMind program, FIKR has created a movement for community-based mental health services, driven by a revenue-generating combination of paid and pro bono therapists and practitioners to make mental health care available and affordable without stigma. He uses both in-person and web-based support services to build his system for multi-layered support.
Dignity	Prohibition of slavery and forced labour	1. No one shall be held in slavery or servitude.	Recognizing that truckers were largely unaware of the phenomenon of forced-prostitution, let alone that they could do something about it, PAKE is reversing the approach of the past by helping truckers reimagine the positive role their industry can play in tackling the issue. [...]
		2. No one shall be required to perform forced or compulsory labour.	PAKE is also in the early stages of thinking through how Truckers Against Trafficking (TAT) might play an instrumental role in ensuring that similar anti-trafficking protocols be implemented across every mode of transportation in the US.
		3. Trafficking in human beings is prohibited.	

Table C-1. (Continued)

Category	code	Description	Example quotation
	Right to liberty and security	Everyone has the right to liberty and security of person.	For security guards, IDR teaches how to maintain order and cleanliness in a station or a park with people who have little access to water, toilets, and showers, and how to manage possible confrontations between the homeless and passengers.
	Respect for private and family life And Protection of personal data	Everyone has the right to respect for his or her private and family life, home and communications, and the right to the protection of one's personal data. This processed fairly for specified purposes and on the basis of the consent of the person concerned. Everyone has the right of access to data which has been collected concerning him or her, and the right to have it rectified. This is subject to control by an independent authority.	Systematic impact evaluation of crime prevention is limited due to data and privacy restrictions. [...] Most impact from GHJ is reported through positive feedback both from teachers and pedagogues, who state that working with the delinquents is much easier after they have completed the GHJ program.
Freedom	Freedom of expression and information	1. Everyone has the right to freedom of expression, including the right hold opinions and to receive and impart information and ideas without interference. 2. The freedom and pluralism of the media shall be respected.	Under the ROMFO umbrella, Turkey's Roma people are co-creating solutions to their mutual problems, getting empowered by practicing changemaking first-hand, and consequently, challenging the stereotypes forced onto them. ROMFO is also acting as a platform to effectively plan Roma people's future and communicate with decision makers, helping realize the potential of Roma NGOs to cause systematic change for Turkey's most underserved populations. TOL has multiple levels of impact. First, through creating a space for local reporters to uphold core industry standards while educating them in new media techniques, DRJE and his team are keeping alive the flame of independent and professional journalism in some of the most repressive places.
	Freedom of assembly and of association	1. Everyone has the right to freedom of peaceful assembly and to freedom of association at all levels, in particular in political, trade union and civic matters, which implies the right of everyone to form and to join trade unions for the protection of his or her interests.	Designed and led by young people, CAJE builds large-scale collective action to bring about a collective shift toward changemaking.

Table C-1. (*Continued*)

Category	code	Description	Example quotation
	Right to education	1. Everyone has the right to education and to have access to vocational and continuing training, including the possibility to receive free compulsory education. 2. The freedom to found educational establishments with due respect for democratic principles and the right of parents to ensure the education and teaching of their children in conformity with their religious, philosophical and pedagogical convictions shall be respected	OGTE has transformed the Polish education system by introducing alternative forms of preschool education. OGTE has done this by creating flexible and inexpensive community-based programs for children's growth, that respond to the economic situations of rural and provincial areas in Poland. [...] She has focused efforts on transforming the early education sector so that every child has equal access to educational facilities and the chance to participate in diverse learning opportunities.
	Freedom to choose an occupation and right to engage in work	1. Everyone has the right to engage in work and to pursue a freely chosen or accepted occupation, and can seek employment, to work, to exercise the right of establishment and to provide services in any Member State.	Gelecek Daha Net empowers and encourages youth self-determination with the ability to make informed education, career choices and life choices. This results in lower high school, university and job dropout rates, fulfilled personal lives and a more productive economy and society.
Freedom	Freedom to conduct a business	The freedom to conduct a business in accordance with Union law and national laws and practices is recognised.	In Germany and throughout Europe, insolvency dooms one's condition financially and also socially. Using the spirit, engagement, and skill of insolvent micro-entrepreneurs in a peer help group, VOAT empowers, destigmatizes and lobbies for insolvent peoples' ability to restart their entrepreneurial lives.
	Right to property	1. Everyone has the right to own, use, dispose of and bequeath his or her lawfully acquired possessions. No one may be deprived of his or her possessions, except in the public interest and in the cases and under the conditions provided for by law, subject to fair compensation being paid in good time for their loss. The use of property may be regulated by law in so far as is necessary for the general interest.	YOCH's new idea is on a trajectory towards correcting the flawed infrastructures of financing, land leasing and ownership that perpetuates the continuing decline of the North American family farmer.

Table C-1. (Continued)

Category	code	Description	Example quotation
	Equality before the law	Everyone is equal before the law.	In addition to outreach and support, ABAB and his colleagues advocate through the Israeli court system to ensure equal access and the protection of inalienable rights.
Equality	Non-discrimination And Equality between women and men	1. Any discrimination based on any ground such as nationality, sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation shall be prohibited. 2. Equality between women and men must be ensured in all areas, including employment, work and pay; but this principle of equality shall not prevent the maintenance or adoption of measures providing for specific advantages in favour of the under-represented sex.	At the national level, RINO works on influencing the public opinion and the policy making process to combat social exclusion and eliminate stigma. She is part of various national committees such as the Antidiscrimination Roundtable. RINO has been central in generating a society-wide discourse in Hungary challenging stereotypes around marginalized kids and communities by using the multiplication effect of her media strategy drawing on her blog, a network of journalists, social media channels and movies.
	Cultural, religious and linguistic diversity	The organisation shall respect cultural, religious and linguistic diversity.	The identification of problems, resources and strategies happen in traditional community meeting settings where [FOHA] facilitates the first meeting and passes on the role of the facilitator to others. [...] She guides a unique process that brings together principles of community organizing with Roma culture, helping Roma identify and mobilize around social challenges, develop strategies, leverage resources and organize related stakeholders to launch new interventions, projects and organizations.
	The rights of the child	1. Children shall have the right to such protection and care as is necessary for their well-being. They may express their views freely, which are taken into account in accordance with their age and maturity. 2. In all actions relating to children, the child's best interests must be a primary consideration. 3. Every child shall have the right to maintain in direct personal contact with both his or her parents	By opening up venues and spaces where children can directly participate and be active agents in decision-making processes at their schools, neighborhoods, cities or parliament, KIEM's Agenda Children seeks to do exactly what the name entails: to put children's will and issues on Turkey's busy agenda

Table C-1. (*Continued*)

Category	code	Description	Example quotation
	The rights of the elderly	The organisation recognises and respects the rights of the elderly to lead a life of dignity and independence and to participate in social and cultural life.	KOLO is humanizing long-term care for the elderly in Norway by placing activity and social interaction at the center of the care regimens in nursing homes and empowering their occupants to play active roles in designing those regimens and reclaiming their rights as senior citizens.
Equality	Integration of persons with disabilities	The organisation recognises and respects the right of persons with disabilities to benefit from measures designed to ensure their independence, social and occupational integration and participation in the life of the community.	NEMI is transforming visual communication through a simple, universal and inclusive code that represents colors. Through ColorADD, NEMI is building a world where the social inclusion of color blind people becomes the norm.
	Fair and just working conditions	1. Every worker has the right to working conditions which respect his or her health, safety and dignity. And a limitation of maximum working hours, to daily and weekly rest periods and to an annual period of paid leave.	JAAR is convinced that disabled people need nothing different from what average people need. They crave rewarding jobs and respect. Even those severely disabled want to feel needed and respected, even if they cannot perform to the same degree as people who are less severely disabled or not disabled at all. Aron's aim is to ensure that every person employed in the work centers is driven to perform the best they can.
Solidarity	Family and professional life	1. The family shall enjoy legal, economic and social protection. They are protected from dismissal due to maternity. And shall enjoy maternity leave after birth or adoption of a child. This to reconcile family and professional life.	While mainstream gender equality thinking focuses on equal pay for equal work, and of fairly shared responsibilities at home, LEIS shifts the debate to empower both men and women to embrace their true aspirations for personal and professional success, and then shows how this ultimately advances the economy.
	Social security and social assistance	The organisation provides social security benefits and social services providing protection in cases such as maternity, illness, industrial accidents, dependency or old age, and in the case of loss of employment. And/or the organisation combats social exclusion and poverty, and assistance for those who lack sufficient resources	Real Pearl's complete engagement strategy offers three types of services: crisis management (provision of food, housing, clothing, debt management, contraception, drug prescriptions, etc.), training in literacy, technical and other traditional skills (designed with self-efficacy in mind) and specific work related training opportunities for local business initiatives. The Foundation provides small scale work and crafts activities to introduce parents to the labor market and give opportunities for easy wins. These ventures are for income generation and self-sustainability.

Table C-1. *(Continued)*

Category	code	Description	Example quotation
	Health care	Everyone has the right of access to preventive health care and the right to benefit from medical treatment under the conditions established by national laws and practices. A high level of human health protection shall be ensured in the definition and implementation of all the Union's policies and activities.	Dr. BLBR has pioneered a way to improve patients' lives quickly and safely by repurposing existing drugs, treatments and medical devices. Rather than waiting for elusive scientific breakthroughs, BLBR brings researchers, clinicians and philanthropic partners together to speed promising research into patient care to improve quality and length of life for patients with debilitating, but often rare, diseases.
	Access to services of general economic interest	The Union recognises and respects access to services of general economic interest as provided for in national laws and practices, in accordance with the Treaties, in order to promote the social and territorial cohesion of the Union.	Key to each concept is the combination of (i) food supply (ii) services (iii) welfare offers like social and medical consultations and (iv) communication/community dialogue and (v) cultural offers—a combination that differentiates DORV from all other local (food) supply initiatives in Germany. This is, next to the local ownership, one of the main success factors.
Solidarity	Environmental protection	A high level of environmental protection and the improvement of the quality of the environment must be integrated into the policies of the Union and ensured in accordance with the principle of sustainable development.	Since 1950, 20 percent of sea species have disappeared and the rate of extinction of marine species has been accelerating so fast that there could be few wild fish left by 2050. To reverse this situation, NOCL is building a collaborative research community that enables and pushes companies, citizen organizations (COs), and governments to change every step in how the world deals with the oceans. With her organization, Bloom, NOCL is enjoying early species preservation successes.
	Consumer protection	Union policies shall ensure a high level of consumer protection.	In parallel, still relying on scientific proof, NOCL denounces those who refuse to act and builds consumer and citizen sector pressure to incentivize them to change. For example, the unsustainable practices of supermarket chains have been one of her major battles. She has notably identified and revealed how a well-known supermarket chain was misleading consumers.

Table C-1. *(Continued)*

Category	code	Description	Example quotation
	Right to good administration And access to documents	1. Every person has the right to have his or her affairs handled impartially, fairly and within a reasonable time by the [company]. This right includes: (a) the right of every person to be heard, before any individual measure which would affect him or her adversely is taken; (b) the right of every person to have access to his or her file, while respecting the legitimate interests of confidentiality and of professional and business secrecy; (c) the obligation of the administration to give reasons for its decisions. 2. Any citizen, has a right of access to documents of the company	Athletes are also provided an infrastructure that helps them identify impactful, professional and transparent NGO projects which also takes care of the administrative issues related to fundraising and grantmaking. On the other hand, NGOAthletes are also provided an infrastructure that helps them identify impactful, professional and transparent NGO projects which also takes care of the administrative issues related to fundraising and grantmaking. On the other hand, NGOs are able to publicize their work and projects, are coached to implement their project professionally and report on them transparently while also encouraged to learn from other Adim Adim beneficiaries. While the donated funds go directly to research, the research institution contributes 10% of the research cost to cover P4C's administrative costs. This contribution ensures quality and efficiency of the research, since the institution is equally invested. P4C stays very involved throughout the process to ensure business rigor to compress timelines, leverage investments, report widely and provide complete transparency. Especially within small disease communities, news of successes spreads rapidly, through medical journals and disease-specific support groups.
Citizens' rights	Freedom of movement and of residence	1. Every citizen of the Union has the right to move and reside freely	FRKA is introducing a creative approach to public transit that helps members plan for and navigate the transition from driving to riding. She mobilizes volunteer drivers and their vehicles and redirects private money that is already getting spent on transportation (car ownership, insurance, and fuel) for use in a shared solution.

Table C-1. (*Continued*)

Category	code	Description	Example quotation
Justice			
	Principles of legality	An explicit focus on developing, implementing or scaling an innovative solution that stays within the legal boundaries	The second element is ensuring a transparent, agile and rigorous management model that guarantees effective coordination from the organ donation until the transplant. Every time a donation is authorized, more than 100 people have to activate and coordinate for the process to successfully take place. For this, the coordination network is accompanied by a management system that addresses with the utmost quality and transparency challenges such as transportation, legal matters or coordination between teams and hospitals.

Table C-2. *Actions*

Category	Definition	Codes	Example
Educating	SEO provides educational services or encourages schooling	Educating, schooling, provide education, curriculum, teaching,	…to educate people on the dangers of drugs and bring into the open taboo subjects like premarital sex and conflicts between the older generation and the young (Theater Group)
Training	SEO emphasizes activities to build skills of actors	Training, skill building activities, providing vocational services, building capabilities	Swayam organizes training in types of work where there is demand for workers, including sectors that have traditionally been reserved for men such as electrical services, plumbing and horticulture (Swayam)
Networking	SEO applies methods to connect people and organizations	Networking, interlocking, linking, connecting, bridging, build relationships, exchange programs, facilitate meeting, forums, summits	With just US$ 250,000 a year, he has been able to organize five World Summits that have brought together around 400 participants from 25 countries (World Toilet Organization)
Counseling	SEO advises and guides actors	Counseling, advising	The services Fenestra offers include crisis assistance and consultancy, counseling, legal advice and advocacy (Fenestra ZZZ)
Organizing	SEO develops management services	Managing, organizing	Gram Vikas works with the villagers to create and manage a "village corpus," a fund that draws cash and in-kind contributions from all families based on ability to pay (Gram Vikas)
Lending	SEO provides loans and financial services	Lending, provide financial services, credits, loans, financing	The mission of BASIX is to promote a critical mass of opportunities for the rural poor and attract commercial funding by proving that lending to the poor can be a viable business (BASIX)
Treating medically	SEO provides healthcare services	Health services, provide healthcare, medical treatment	CEGIN SRL is a completely self-financed and profitable company, which offers accessibly priced health services to mothers, their children and women in poor rural areas (Centro Ginecológico Integral—CEGIN SRL)

Note. Reprinted from "Organizing for Society: A Typology of Social Entrepreneuring Models" by Mair, J. and Battilana, J.C., 2013, *Journal of Business Ethics, volume 1,* page 370

Table C-3. *Principles*

Principles	Worth	Typical Behavior	Relationship	Expressions	Key Words
Civic	Collective interest	Mobilizing people for a collective action	Common interest, solidarity	Cooperatives, federations, assemblies	Citizenship, collaboration Community approach Cooperative Participatory Representative Unity: cohesion
Domestic	Trust and respect for tradition, hierarchy and kinship	Preserving and reproducing	Kinship, face-to-face	Household, customs, habits	Culture Family: home Stability Tradition
Fame	Public opinion, opinion of others	Influencing, sensitizing and achieving signs of public esteem	Recognition	Press conferences, media campaigns	Campaign dissemination Media Public opinion Publishing Raise awareness
Industrial	Efficiency, productivity and operational effectiveness	Implementing tools, methods and plans	Functional, standardized, measurable	Organization	Efficiency Experts Functional Method: standardize Organization: management Productive Professionalize
Inspired	Creativeness, nonconformity	Dreaming, imagining and rebelling	Emotional, passion	Arts	Arts Dreams Games Innovation: creativity Wealth: profits Valuable: salable
Market	Mediation of scarce goods and services; price serves as a mechanism to evaluate these scarce goods	Competing and spotting market opportunities	Exchange, competitive	Salable and marketable things	Commercial Competitive Income-generation Ownership

Summary

Problem statement

Societies all over the world are facing grand challenges that require innovative solutions. These challenges can be related to climate-change, ageing populations or increasing socio-economic inequalities (George et al. 2016). Innovation is often seen as a panacea, a mean to resolve the problems that we are facing. However, innovations are not inherently good (Godin 2015) as they may fail to take socio-ethical considerations into account or may have unforeseen detrimental consequences.

Responsible innovation is a new innovation concept that aims to take socio-ethical considerations into account during the earliest stages of the innovation process. This requires that the development of innovations are not only confined to the views of experts but that it is opened up to stakeholders and members of the public as well. This enables to better foresee the possible implications of the innovation and to steer it towards a desirable direction. Responsible innovation aims for anticipatory governance of innovation based on deliberative forms of stakeholder engagement.

While this new and upcoming innovation concept is admirable, it remains unknown what it actually entails as its contents are open and flexible (Bos et al. 2014). Furthermore, it is still not clear how responsible innovation can be implemented in practice in general and business contexts in particular. Blok & Lemmens (2015) argue that it is even highly questionable to implement the current notion of responsible innovation in a business context. This is unfortunate as businesses are the actors in society that do not only develop innovations but also bring these innovations to the market. It is therefore vital to develop an understanding of responsible innovation that can be implemented in business contexts.

Research goals

The following research goals are formulated to respond to the knowledge gaps that are stipulated in the previous section. This PhD thesis aims:

1. To clarify the concept of responsible innovation by analysing where it is conceptually similar and dissimilar from social innovation and sustainable innovation.
2. To identify innovation practices and processes that can help to implement responsible innovation in a business context.
3. To identify and describe typologies of *de facto* responsible innovation processes in a social entrepreneurship context.
4. To find out how normative values are integrated into innovative solutions by social entrepreneurs, and describe the strategies to develop and implement such solutions.

The first two goals are met in the theoretical part of this PhD thesis, which consists of a conceptual study and a systematic literature review. The third and fourth goal are met in the empirical research of *de facto*

responsible innovation in social enterprises, which involves a mixed methodology study that focuses on the process dimension, and a qualitative case study that focuses on the product dimension of innovation.

Conceptual framework

There are two main approaches to responsible innovation used in this PhD thesis, namely the procedural and the normative (substantive) approach.

Procedural approach. This approach is based on the idea that innovations can be deemed responsible if the process to develop these innovations adheres to certain conditions (Pellé 2016). The procedural framework for responsible innovation by Stilgoe et al. (2013) is among the most influential works in the field of responsible innovation (Burget et al. 2017). It consists of four dimensions that one should adhere to during the development of the innovation: anticipation, reflexivity, inclusion and responsiveness.

Anticipation involves activities that enable to foresee desirable future states that could guide the innovation, while being aware of the uncertainties and probabilities that innovations can have negative consequences as well. *Reflexivity* implies the innovator scrutinises one's own knowledge, assumptions and actions while being aware that one's perspective on reality may not be universally held. *Inclusion* boils down to engaging with stakeholders and members of the public during the development of the innovation, who discuss about the innovation at stake. *Responsiveness* is about actually responding to new insights during the innovation process and realigning the innovation with changing needs and values of stakeholders and the public. Hence, the procedural approach focuses on the process dimension of innovation as opposed to the innovation outcomes.

Normative substantive approach. This approach is based on the idea that there are certain values that need to be integrated into the innovation outcome. There are societal values that are already democratically agreed upon, which can be used as a moral compass for innovation outcomes (Von Schomberg 2013; Von Schomberg 2011; Von Schomberg 2012). These values, and their underlying rights, principles and freedoms, are stipulated in the EU Treaty and its Charter of Fundamental Rights. This for example implies that innovations should respect the rights of the elderly, environmental protection or preventive health care. These predetermined values and their underlying rights, principles and freedoms can be condensed into three normative anchor points that the innovation process *and* its marketable products should adhere to, which are: ethical acceptability, societal desirability and sustainability. The normative substantive approach is therefore more related to the product dimension of innovation compared to the procedural approach.

Social Entrepreneurship. There is no consensus on the definition or conceptualisation of the phenomenon social entrepreneurship. The following definition was used as a working definition in this thesis: *"Social entrepreneurship is exercised where some person or group: (1) aim(s) at creating social value, either exclusively or at least in some prominent way; (2) show(s) a capacity to recognize and take advantage of opportunities to create that value ("envision"); (3) employ(s) innovation, ranging from outright invention to adapting someone else's novelty, in creating and/or distributing social value; (4) is/are willing to accept an above-average degree of risk in*

creating and disseminating social value; and (5) is/are unusually resourceful in being relatively undaunted by scarce assets in pursuing their social venture" (Peredo & McLean 2006, p.64). While all social entrepreneurs create social value, they are heterogeneous regarding their organisational forms, personalities, and the extent of innovativeness and market-orientation (Choi & Majumdar 2014).

Chapter 2: Conceptual analyses of responsible-, social- and sustainable innovation

This chapter aimed to clarify and advance the concept of responsible innovation in a business context by analysing where it is conceptually similar and dissimilar from social innovation and sustainable innovation. The latter are two related innovation concepts but they are already diffused throughout the business community as opposed to responsible innovation. For this chapter, there is predominantly looked into systematic literature reviews that investigated the scientific fields of these innovation concepts.

The findings show that responsible innovation is a concept that aims to respond to the inherent uncertainties that come with innovation. Even though it aims to focus on articulating desirable futures that can be used to guide innovation processes, it also acknowledges and aims to address the inherent uncertainties that innovations can have negative consequences as well. Furthermore, responsible innovation champions a deliberative democratic governance of innovation as opposed to social- and sustainable innovation. However, it is questionable whether a deliberative democratic governance of innovation is possible in business contexts. Social- and sustainable innovation do not propagate that it should be a representative stakeholder network.

The conceptual analyses also revealed that responsible innovation shares multiple conceptual similarities with social- and sustainable innovation. They all share a common driver for innovation, which are grand challenges that require innovative solutions. Even though sustainable innovation proclaims the triple bottom line, it has a tendency to focus on climate-related challenges. Social innovation focuses more on societal problems and pressing social needs. With regard to the development of innovation, it appears that social- and responsible innovation both require coordinate collective action. They are not only social in their outcomes but also in their process. Likewise, the most radical champions of sustainable innovation also develop innovations together with stakeholders, even unconventional ones. With regard to the innovation outcomes, it appears that responsible innovation has a narrow understanding as its outcomes are confined to science and technological development. However, social- and sustainable innovation both consider systems-shaping innovations that consist of several underlying interrelated innovations. Furthermore, these may be products, processes, or business models, among others.

The conclusion that can be drawn from the findings is that social- and sustainable innovation share multiple conceptual similarities, and can therefore be informative for developing an understanding of responsible innovation in a business context. Furthermore, they share common characteristics with regard to the innovation process but responsible innovation aims to accommodate the inherent uncertainties that come with innovation. This should also be maintained for responsible innovation in business contexts. However, the inclusion of all relevant stakeholders throughout a transparent innovation process is

questionable in a business context. Furthermore, the notion of innovation should be broadened for responsible innovations in a business context and include other forms of innovation in addition to science and technologies.

Chapter 3: A Systematic Literature Review to Identify Innovation Practices For Implementing Responsible Innovation in a Business Context

Chapter 3 presents a systematic literature review to identify, analyse and synthesise findings in empirical studies that reported social-, sustainable- and responsible innovation in business contexts. By doing so, it is possible to prevent reinvention of the wheel and instead learn from knowledge generated in the adjacent fields as well. The findings from Chapter 2 therefore served as a first step for in-depth systematic analyses of empirical papers.

The procedural framework of responsible innovation by Stilgoe et al. (2013) was used as an initial architecture to analyse 72 empirical papers, which were included for the literature synthesis. The results show that inclusion and deliberation are two different but interrelated dimensions. Stakeholder *inclusion* revolves predominantly around engaging with clients and end-users, and people or organisations with professional expertise. Hence, it is more about which stakeholders to involve and when to involve them. *Deliberation* is about creating the right conditions for an open and honest dialogue, which should result in better decision-making during innovation. However, organisations primarily involve stakeholders who share similar values or stakeholders who are motivated to align their interests with a shared objective of the innovation. Last but not least, *knowledge management* is an additional dimension in the refined framework for responsible innovation in business contexts. These involve activities to resolve practical knowledge gaps during innovation by creating new knowledge in-house and disseminating this throughout their firm, or they involve other organisations to develop knowledge or share knowledge and insights with them.

The systematic literature review in Chapter 3 proposes an adjusted framework for responsible innovation in the business context. Furthermore, it gives practical substance to the initial framework proposed by Stilgoe et al. (2013) with evidence coming from a diverse body of literature. The main conclusion is that implementing responsible innovation requires that companies also reflect on their business models, leadership, and their role and responsibilities in society. The refined framework in Chapter 3 can therefore be seen as a first effort to support further operationalisation of responsible innovation in a business context, and can therefore inform future empirical research that assess to what extent companies implemented responsible innovation dimensions during innovation.

Chapter 4: Innovating For Society: Towards Topologies of Developing Responsible Innovations by Social Entrepreneurs

This chapter focuses predominantly on the process of developing innovations that respond to grand challenges in the context of social entrepreneurship. This is necessary since the innovation process is still an understudied theme in social entrepreneurship (Doherty et al. 2014; Shaw & de Bruin 2013;

Sassmannshausen & Volkmann 2016). At the same time, it remains unknown to what extent responsible innovation can be implemented in a business context (Blok & Lemmens 2015). Following from the knowledge gaps that are stipulated above, the aim of this chapter is to answer the following research question: *what are the different procedural approaches for responsible innovation in the field of social entrepreneurship?* Hence, this chapter cuts both ways as it reflects upon the concept of responsible innovation in a business context and generates new insights regarding the process of innovation in social enterprises.

Based on the key strategies identified in Chapter 3, it was possible to develop a questionnaire that assesses to what extent social entrepreneurs engaged in the dimensions of responsible innovation during the development of their innovative solution. Best-practice social entrepreneurs (i.e. Ashoka fellows) were approached to fill out the questionnaire, which resulted in 39 questionnaires suitable for further analyses. Average hierarchical clustering took place to identify clusters of social entrepreneurs based on the characteristics of their innovation process. Non-parametric tests were done to identify the characteristics of the innovation processes that distinguished clusters from each other. Based on the characteristics it was possible to identify and describe four typologies of innovation processes that can be found in social entrepreneurship (i.e. rushing, wayfinding, rigid visionary and negotiating visionary social entrepreneurs). Each completed questionnaire was complemented with a profile description of the social entrepreneur (obtained from the Ashoka database), which allowed to identify contextual factors that may explain the results from quantitative analyses. This means that this chapter adopted a mixed-methodology study design.

The findings show that there are four different typologies as to how social entrepreneurs manage to transform their initial ideas into innovative solutions that (help to) address societal problems. They all engage to some extent in anticipatory governance of innovation and deliberative forms of stakeholder engagement, also the *rushing* social entrepreneurs who did not really engage in the other dimensions: reflexivity, responsiveness and knowledge management. The *wayfinders* engage in all dimensions of responsible innovation, but their innovations were not really guided by a grand plan nor did they have alternative scenarios in place during the development of their social innovation. They are reflexive, they especially evaluate whether the decision-making is in line with their own norms, values and beliefs. The *rigid visionary* social entrepreneurs seem to have a clear plan to address a societal problem that is based on certain norms and values that guide their decision making. They are engaging stakeholders and foster deliberation about the innovation, yet they make sure to remain in control of the development of the innovation. Hence, the process outcomes of their innovations are therefore similar to their initial ideas. The *negotiating visionary* entrepreneurs also have a clear plan how to develop the innovation, and develop a solution that address the social problem together with their stakeholders who have actual decision making power. They rarely evaluate whether the decision-making is in line with their own norms, values and beliefs.

The first conclusion that can be drawn is that negotiating visionary entrepreneurs and rigid visionary entrepreneurs developed their innovations by starting with a vision that preceded intentions and subsequent actions (Waddock & Steckler 2016). However, the procedural approach appears to be closest to the innovation process of negotiating visionary social entrepreneurs, whereas the rigid visionary social entrepreneurs adopt a more substantive approach to innovation. It therefore differs from case to case which

dimensions of responsible innovation were dominant in the process to develop innovations that respond to grand challenges. The procedural framework of responsible innovation should therefore not be considered as a one-size-fits-all model to develop responsible innovations as other approaches resulted in desirable innovation outcomes as well. Regarding the contextual analyses, this study confirms the findings by Waddock and Steckler (2016) that most social entrepreneurs have formative experiences that give rise to their sense of wanting to make a difference in the world. Other contextual variables (e.g. market orientation, previous experience, organisational structure) did not explain the different typologies.

Chapter 5: *De facto* responsible innovation outcomes and scaling for impact

Where the previous research objective focuses predominantly on the process dimension of responsible innovation, Chapter 5 focuses on the product dimension (i.e. the innovation outcomes and their implications). More specifically, Chapter 5 explores how social entrepreneurs integrate normative values into their *de facto* responsible innovations, and presents strategies to develop, implement and scale these innovations for impact. Von Schomberg (2013) suggests three normative anchor points that can be used as a compass for responsible innovation outcomes. He derived these from public values that are democratically agreed upon and are stipulated in the EU Treaty. Furthermore, they are constituted by rights, principles and freedoms in the EUCFR, which science and innovation should adhere to.

The research participants in this study were the same Ashoka fellows as in Chapter 4, which are well-established social entrepreneurs who act as change agents in society (Mair et al. 2012). Ashoka provides a profile description (approx. 2100 words) for each of their fellows, which contains information about the problem addressed, the new innovative solution, the strategy followed and personal information about the social entrepreneur. There were 42 profile descriptions subject to qualitative content analyses, which was based on a coding scheme derived from the EUCFR. Additionally, the coding schemes to analyse the type of actions undertaken by the social entrepreneur and the justification principles behind the solution were analysed with coding schemes already developed, tested and published in Mair et al. (2012).

The results show that social entrepreneurs integrate more than one right, principle or freedom in to their innovation (e.g. the right of the elderly or right to preventive health care), and often address more than one category of the EUCFR (e.g. Dignity, Solidarity or Equality). The integrated rights, principles or freedoms are often directly related to the societal problem or neglected social needs, while at the same time the social entrepreneurs see opportunities to integrate additional rights, principles and freedoms as well. Furthermore, they proactively look to remove barriers that may prevent their target beneficiaries from adopting the innovation. The first conclusion that was drawn is therefore that social entrepreneurs aim to create direct socio-ethical value for their target beneficiaries. The innovations that they developed are however not singular, instead they are systems-shaping solutions that consist of several underlying interrelated innovations. The social enterprises do not implement and scale these systems-shaping solution on their own, but they often coordinate collective stakeholder action to implement and scale the innovative solution.

Piloting the innovation and evaluating whether it is efficient and/or effective in solving the societal problem is common among the social enterprises in the sample. Social entrepreneurs start with scaling when the final innovation appears to be efficient and effective in solving the social problem or addressing the social needs. They disseminate the innovation among other organisations to increase impact, they aim to further improve the innovation for creating quality social impact, address new target beneficiaries or new challenges. Ultimately, the real change agents in the sample start to become involved in policy making, thereby combining their bottom-up processes with top-down induced change in society. The conclusion that can be drawn is that social entrepreneurs engage in radical incrementalism, which is suggested as one of the ways to deal with the dilemma of control (van de Poel 2016). The focus on creating direct social value, the importance of coordinating collective action and realising radical incrementalism is translated into a model for responsible innovation that involves bottom-up innovation and scaling for systems-changes.

Social entrepreneurs aim to create social value while adopting business logics of efficiency (André & Pache 2016) which enables them to sustain and maximise social impact. This also becomes evident in the importance not only of developing innovations but also implementing and scaling these innovations. Blok and Lemmens (2015) provided an extensive list of factors that hinder the implementation of responsible innovation in a business context. However, following from the findings, the argument can be made that the business logic may also be an opportunity for the concept of responsible innovation to live up to its ambition, that is to innovate *for* society. The current concept of responsible innovation focuses predominantly on the development of innovation, whereas the social entrepreneurship cases show that implementation and scaling are crucial to create impact for society. Responsible innovation should cover these later stages too, not to live up to its ambition but also because André and Pache (2016) found that scaling is not inherently good as it can conflict with one's ethical principles.

Conclusions

Responsible innovations in business contexts respond to grand challenges, for example related to climate change, ageing populations or socio-economic inequalities, but also other neglected societal problems or pressing social needs. However, the innovative solutions are probably not single innovations. The theoretical and empirical studies both show that responsible innovations are often systems-shaping solutions that consist of several underlying interrelated innovations. Furthermore, these underlying innovations are not technology-based innovations but can also take the form of process-, product- or business model innovations, among others. The systems-shaping solutions in response to grand challenges often require coordinated collective action of stakeholders (George et al. 2016) which also became evident in the empirical part of this PhD thesis. The case studies show that the company who initiates the responsible innovation is often the coordinator of such collective stakeholder action. This requires that they engage in a more open innovation process, but this is not the same as a transparent innovation process.

Even though social enterprises are different from profit-oriented enterprises, the case studies do show that responsible innovations *can* be developed, implemented and scaled in a business context. Their

strategies to integrate normative values into innovations can inspire their for-profit peers to integrate ethics in innovation as well. Responsible innovation in a business context (by both social- and profit oriented entrepreneurs) therefore requires strategies to integrate normative values into innovative solutions for grand challenges, and an aim to prevent any violation of the rights, principles or freedoms that are stipulated in the EU Treaty and its Charter of Fundamental Rights (Ruggiu 2015). However, integrating values into innovation does not require processes of deliberation with a representative network of stakeholders to determine the values for innovation. The systematic literature review and the empirical part show that it is crucial to engage directly with the target beneficiary. Responsible innovation may focus on creating direct socio-ethical value for the target beneficiaries, which may be vulnerable communities in society. Responsible innovations can have more impact for society if there is proactively searched for ways to remove barriers to innovation adoption, especially adoption by the target beneficiaries.

Responsible innovation may be presented here as a rigid linear innovation process; however, it should not be interpreted as such since real-life innovations are of more heterogeneous nature. For example, the empirical investigation of *de facto* responsible innovation in social entrepreneurship shows that there are multiple ways for companies to develop innovations that benefit society. This means that responsible innovation in a business context cannot be regarded as a one-size-fits all model to guide initial ideas for innovation towards desirable solutions that respond to grand challenges. Furthermore, responsible innovation in business context does not only revolve around the process dimension.

The innovation process needs to be coupled with implementation and subsequent scaling to maximise impact. The development and implementation can be done on a small scale (e.g. community level) where responsible innovations can subsequently be piloted and tested for their effectiveness and efficiency. If the innovation appears to have the desirable implications, it can be subsequently scaled to generate larger scale impact for society. Furthermore, this may create legitimacy for the social entrepreneur to engage in policy making, and thereby creating top-down induced change in society. Responsible innovations in a business context can therefore be developed based on the approach of radical incrementalism, which is suggested as a strategy to overcome the dilemma of control (van de Poel 2016).

In the introduction of this PhD thesis there is argued that the business logic may prevent implementation of responsible innovations in a business context. However, the final conclusion is that the business logic may also provide opportunities for the field of responsible innovation. The business logic urges one to focus on implementing the innovation and scaling for impact. They therefore form an opportunity for the concept of responsible innovation and to live up to its ambition to innovate with society and *for* society.

Samenvatting

Het probleem

Samenlevingen over de hele wereld worden geconfronteerd met grote uitdagingen waarvoor innovatieve oplossingen nodig zijn. Deze uitdagingen kunnen verband houden met klimaatverandering, vergrijzing van de bevolking of toenemende sociaaleconomische ongelijkheid (George et al. 2016). Innovatie wordt vaak gezien als een wondermiddel, een middel om de problemen op te lossen waarmee we worden geconfronteerd. Innovaties zijn echter niet per definitie goed (Godin 2015), bijvoorbeeld omdat ze sociaal-ethische overwegingen voldoende in ogenschouw nemen of omdat ze mogelijk onverwachte schadelijke gevolgen hebben.

Verantwoord innoveren is een nieuw innovatieconcept dat sociaal-ethische overwegingen al in ogenschouw neemt vanaf het begin van het innovatieproces. Dit vereist dat de ontwikkeling van innovaties niet alleen beperkt blijft tot de mening van experts, maar dat het ook is opengesteld voor belanghebbenden, maatschappelijke organisaties en burgers. Deze belanghebbenden delen hun kennis, mening of idee over de innovatie onderling met elkaar en met de partij die het innovatieproces bestuurt. De gedachte hierachter is dat de mogelijke implicaties van de innovatie beter kunnen worden voorzien en dat de innovatie in een gewenste richting kan worden gestuurd.

Dit nieuwe en opkomende innovatieconcept is bewonderenswaardig, echter is het ook nog steeds onduidelijk wat het nou precies inhoud. De literatuur is niet eenduidig over wat de bouwstenen zijn van dit innovatieconcept, en waar deze bouwstenen uit bestaan (Bos et al. 2014). Bovendien is het nog steeds niet duidelijk hoe verantwoord innoveren in de praktijk kan worden gebracht, dit geldt met name voor verantwoord innoveren in een bedrijfscontext. Blok & Lemmens (2015) stellen dat het zeer twijfelachtig is of het huidige concept van verantwoorde innoveren überhaupt in de bedrijfspraktijk toe te passen is. Dit is problematisch omdat bedrijven niet alleen innovaties ontwikkelen maar deze ook op de markt brengen. Het is daarom van vitaal belang om tot een idee van verantwoord innoveren te komen die wel kan worden geïmplementeerd in bedrijfscontext.

Onderzoeksdoelen

De volgende onderzoeksdoelen zijn geformuleerd om antwoord te vinden op de vragen die zijn opgeworpen in de vorige sectie. Dit proefschrift beoogt:

1. Om het concept van verantwoorde innovatie te verduidelijken door te bestuderen waar het conceptueel overeenkomt met, en verschilt van, sociale innovatie en duurzame innovatie.
2. Om innovatiepraktijken en processen te identificeren die kunnen helpen om verantwoord innoveren in een bedrijfscontext toe te passen.
3. Het identificeren en beschrijven van typologieën van *de facto* verantwoorde innovatieprocessen in een sociaal ondernemerschapscontext.

4. Te ontdekken hoe normatieve waarden worden geïntegreerd in innovatieve oplossingen ontwikkeld door sociale ondernemers, en de strategieën te beschrijven om dergelijke oplossingen te ontwikkelen en te implementeren.

De eerste twee doelen worden bereikt in het theoretische deel van dit proefschrift, dit theoretische deel bestaat uit een conceptueel onderzoek en een systematisch literatuuronderzoek. Het derde en vierde doel worden bereikt in het empirisch onderzoek van *de facto* verantwoorde innoveren in sociale ondernemingen, waarbij zowel kwalitatieve alsook kwantitatieve methoden worden toegepast waarbij de focus ligt op het innovatieproces. Daarnaast is er een kwalitatieve case study waarin de focus ligt op de uitkomsten van het innovatieproces.

Conceptueel kader

Er zijn twee belangrijke benaderingen voor verantwoorde innovatie die in dit proefschrift worden gebruikt, namelijk de procedurele en de normatieve (substantieve) benadering.

Procedurele aanpak.   Deze benadering is gebaseerd op het idee dat innovaties als verantwoord kunnen worden beschouwd wanneer het innovatieproces aan bepaalde voorwaarden voldoet (Pellé 2016). Het raamwerk voor een procedurele benadering voor verantwoorde innovatie dat is ontwikkeld door Stilgoe et al. (2013) is een van de meest invloedrijke werken op het gebied van verantwoord innoveren (Burget et al. 2017). Het bestaat uit vier dimensies waaraan men zich tijdens de ontwikkeling van de innovatie moet houden: anticipatie, reflexiviteit, stakeholder inclusie en responsiviteit.

Anticipatie omvat activiteiten die het mogelijk maken om na te denken over wat wenselijke toekomsten zijn. Deze visies kunnen vervolgens gebruikt worden om, tijdens de ontwikkeling, de innovatie in een gewenste richting te sturen. Hierbij is het belangrijk dat men bewust is van alle onzekerheden die aan innovatie hangen en de mogelijkheid dat een innovatie ook negatieve (bij)effecten kan hebben. *Reflexiviteit* houdt in dat de innovator de eigen kennis, aannames en acties onder de loep neemt, terwijl de innovator zich ervan bewust is van het feit dat het perspectief van diegene op de werkelijkheid niet hetzelfde hoeft te zijn voor andere personen. *Inclusie* komt neer op het betrekken van belanghebbenden en burgers tijdens de ontwikkeling van de innovatie, die onderling en samen met de innovator discussiëren over de innovatie. *Responsiviteit* gaat over het daadwerkelijk reageren op nieuwe inzichten die tijdens het innovatieproces worden verkregen, en het afstemmen van de innovatie op de behoeftes en waarden van belanghebbenden en het publiek. Vandaar dat de procedurele benadering zich richt op de procesdimensie van innovatie in tegenstelling tot de innovatie-uitkomsten.

Normatieve (substantieve) aanpak.   Deze benadering is gebaseerd op het idee dat er bepaalde waarden zijn die moeten worden geïntegreerd in de innovatie-uitkomst. Er zijn echter al maatschappelijke waarden die democratisch zijn overeengekomen, en die daarom gebruikt kunnen worden als een moreel kompas voor innovatie-uitkomsten (Von Schomberg 2013; Von Schomberg 2011; Von Schomberg 2012).

Deze waarden en hun onderliggende rechten, beginselen en vrijheden zijn vastgelegd in het EU-Verdrag en het handvest van de grondrechten van de Europese Unie. Dit houdt bijvoorbeeld in dat innovaties de rechten van ouderen, het milieu of preventieve gezondheidszorg moeten respecteren. Deze vooraf bepaalde waarden en hun onderliggende rechten, principes en vrijheden kunnen worden samengevat in drie normatieve ankerpunten die het innovatieproces en de uiteindelijke innovatie moeten naleven, namelijk: ethische aanvaardbaarheid, maatschappelijke wenselijkheid en duurzaamheid. De normatieve substantieve benadering houdt daarom meer verband met de productdimensie van innovatie in vergelijking met de procedurele benadering.

Sociaal ondernemerschap.　　　Onderzoekers zijn nog niet tot een overeenkomst gekomen over hoe het fenomeen sociaal ondernemerschap kan worden geconceptualiseerd. De volgende definitie is in dit proefschrift gebruikt als werkdefinitie: *"Sociaal ondernemerschap wordt uitgeoefend wanneer een persoon of groep: (1) streeft (s) naar het creëren van maatschappelijke waarde, hetzij uitsluitend, of op zijn minst op een prominente manier; (2) toont een vermogen om kansen te herkennen en te benutten om die waarde te creëren ("visualiseren"); (3) innovatie toepassen (wat een daadwerkelijke eigen uitvinding kan zijn tot het aanpassen van andermans innovatie) in het creëren en / of verspreiden van maatschappelijke waarde; (4) bereid is om een bovengemiddeld risico te accepteren in het creëren en verspreiden van maatschappelijke waarde; en (5) is / zijn buitengewoon vindingrijk en niet snel ontmoedigd door schaarse activa bij het nastreven van hun sociale onderneming"* (Peredo & McLean 2006, p.64). Hoewel alle sociale ondernemers maatschappelijke waarde creëren, zijn ze onderling verschillend met betrekking tot hun organisatievormen, persoonlijkheden en de mate van innovatie en marktgerichtheid (Choi & Majumdar, 2014).

Hoofdstuk 2: Conceptuele analyses van verantwoorde, sociale en duurzame innovatie

Dit hoofdstuk was bedoeld om het concept van verantwoord innoveren in een bedrijfscontext te verduidelijken en te bevorderen door te analyseren waar het conceptueel vergelijkbaar is met, en verschillend van, sociale- en duurzame innovatie. De laatste zijn twee gerelateerde innovatieconcepten, maar ze zijn alom bekend in het bedrijfsleven in tegenstelling tot verantwoorde innovatie. Voor dit hoofdstuk wordt voornamelijk gekeken naar systematische literatuuronderzoeken die verkregen wetenschappelijke inzichten in kaart hebben gebracht uit voorgaande onderzoeken in deze drie innovatie velden.

De bevindingen tonen aan dat verantwoord innoveren een concept is dat erop gericht is te reageren op de inherente onzekerheden die gepaard gaan met innovatie. Hoewel het zich richt op het formuleren van wenselijke toekomsten die kunnen worden gebruikt om innovatieprocessen te sturen, erkent het ook dat innovaties negatieve gevolgen kunnen hebben waar men op zal moeten anticiperen. Verantwoord innoveren pleit bovendien voor een deliberatief democratisch bestuur van innovatie in tegenstelling tot sociale en duurzame innovatie. Het is echter de vraag of een deliberatief democratisch bestuur van innovatie mogelijk is in een bedrijfscontext. Sociale en duurzame innovatie propageren bijvoorbeeld niet dat het een representatief stakeholdernetwerk moet zijn dat betrokken is in de ontwikkeling van de innovatie.

De conceptuele analyses brachten ook aan het licht dat verantwoord innoveren meerdere conceptuele overeenkomsten deelt met sociale en duurzame innovatie. Ze delen allemaal een gemeenschappelijke drijfveer voor innovatie, namelijk de complexe maatschappelijke problemen waarvoor innovatieve oplossingen nodig zijn. Hoewel duurzame innovatie de 3P's (people, planet and profit) verkondigt, heeft het de neiging zich te concentreren op klimaat gerelateerde uitdagingen. Sociale innovatie richt zich meer op maatschappelijke problemen en dringende sociale behoeften. Met betrekking tot de ontwikkeling van innovatie, blijkt dat sociale en verantwoorde innovatie beide gecoördineerde collectieve actie vereisen. Ze zijn niet alleen sociaal in hun uitkomsten, maar ook in hun proces. Op dezelfde manier ontwikkelen de meest radicale voorvechters van duurzame innovatie ook innovaties samen met belanghebbenden, zelfs onconventionele. Verantwoord innoveren houdt zich vooral bezig met wetenschap en technologische ontwikkeling wat duidt op een beperkt begrip van mogelijke innovatie-uitkomsten. Echter, sociale en duurzame innovatie beschouwen ook systeeminnovaties als innovatie uitkomsten, deze uitkomsten bestaan uit verschillende onderling gerelateerde kleinere innovaties. Verder kunnen innovatie uitkomsten onder andere producten, processen of bedrijfsmodellen zijn.

De conclusie die uit de bevindingen kan worden getrokken, is dat sociale en duurzame innovatie meerdere conceptuele overeenkomsten delen en daarom informatief kunnen zijn voor het ontwikkelen van een nieuw begrip van verantwoord innoveren in een bedrijfscontext. Bovendien hebben ze gemeenschappelijke kenmerken met betrekking tot het innovatieproces, echter is verantwoord innoveren bewuster bezig met de inherente onzekerheden die samenhangen met innovatie. Dit moet daarom ook worden gehandhaafd voor verantwoorde innovatie in bedrijfscontexten. Het betrekken van alle relevante belanghebbenden in een transparant innovatieproces is twijfelachtig in een bedrijfscontext. Bovendien moet het begrip van innovatie uitkomsten worden verruimd voor verantwoord innoveren. Naast wetenschappelijke kennis en technologieën moet het ook andere vormen van innovatie omvatten.

Hoofdstuk 3: Een systematische literatuurstudie om innovatiepraktijken te identificeren voor het implementeren van verantwoorde innovatie in een bedrijfscontext

Dit hoofdstuk is gebaseerd op een systematische literatuuronderzoek om inzichten te identificeren, analyseren en synthetiseren die zijn gerapporteerd in empirische studies die sociale, duurzame en verantwoorde innovatie in bedrijfscontexten hebben onderzocht. Dit voorkomt het opnieuw uitvinden van het wiel, en in plaats daarvan kunnen we leren van kennis dat voortkomt uit aangrenzende onderzoeksvelden. De bevindingen uit hoofdstuk 2 dienden daarom als een eerste stap voor de diepgaande systematische analyses van empirische artikelen.

Het procedurele raamwerk voor verantwoorde innoveren door Stilgoe et al. (2013) is hierbij gebruikt als een initiële architectuur om 72 empirische artikelen te analyseren en vervolgens te synthetiseren. De resultaten laten zien dat inclusie en deliberatie twee verschillende maar met elkaar verbonden dimensies zijn. Stakeholder *inclusie* draait voornamelijk rond het contact met klanten en eindgebruikers, en met mensen of organisaties die expert zijn in hun professie. Het gaat daarom meer om welke stakeholders erbij betrokken

zijn en wanneer hen te betrekken in het innovatieproces. *Deliberatie* gaat over het creëren van de juiste voorwaarden voor een open en eerlijke dialoog, die moet leiden tot betere besluitvorming tijdens het innovatieproces over de desbetreffende innovatie. Organisaties betrekken echter voornamelijk stakeholders die dezelfde waarden delen of stakeholders die gemotiveerd zijn om hun belangen af te stemmen op een gezamenlijk doel van de innovatie. Afsluitend is *knowledge management* een extra dimensie in het verfijnde framework voor verantwoord innoveren in bedrijfscontexten dat is ontwikkeld in deze thesis. Het gaat hierbij om activiteiten die afwezige kennis omtrent innovatie kunnen oplossen. Dit kan door kennis binnen het bedrijf te creëren en te verspreiden, of door andere organisaties te betrekken bij het ontwikkelen van nieuwe kennis, of het delen van kennis en inzichten met andere organisaties.

De systematische literatuurstudie in hoofdstuk 3 biedt een verfijnd framework aan voor verantwoord innoveren in de bedrijfscontext. Bovendien geeft het praktische inhoud aan het oorspronkelijke framework dat is voorgesteld door Stilgoe et al. (2013), met bewijsmateriaal afkomstig uit diverse literatuur. De belangrijkste conclusie is dat het implementeren van verantwoord innoveren vereist dat bedrijven ook nadenken over hun bedrijfsmodellen, leiderschap en hun rol en verantwoordelijkheden in de samenleving. Het verfijnde framework in hoofdstuk 3 kan daarom worden gezien als een eerste poging om verdere operationalisatie van verantwoorde innovatie in een bedrijfscontext te ondersteunen, en kan daarom toekomstig empirisch onderzoek informeren dat bijvoorbeeld kijkt naar de mate waarin bedrijven de dimensies van verantwoord innoveren in de praktijk brengen.

Hoofdstuk 4: Innoveren voor de samenleving: naar typologieën van het ontwikkelen van verantwoorde innovaties door sociale ondernemers.

Dit hoofdstuk richt zich voornamelijk op het proces van het ontwikkelen van innovaties door sociaal ondernemers die een oplossing willen vinden voor grote maatschappelijke uitdagingen. Dit is nodig omdat het innovatieproces nog steeds een onderbelicht thema is in sociaal ondernemerschap (Doherty et al. 2014; Shaw & de Bruin 2013; Sassmannshausen & Volkmann 2016). Tegelijkertijd blijft het onbekend in welke mate verantwoorde innovatie kan worden geïmplementeerd een bedrijfscontext (Blok & Lemmens 2015). Volgend op de kenniskloven die hierboven zijn uitgewerkt, is het doel van dit hoofdstuk om de volgende onderzoeksvraag te beantwoorden: *wat zijn de verschillende procedurele benaderingen voor verantwoord innoveren op het gebied van sociaal ondernemerschap?* De verwachting is dat dit hoofdstuk aan twee kanten kan snijden, het reflecteert op het concept van verantwoord innoveren in een bedrijfscontext en tegelijkertijd creëert het nieuwe inzichten in het innovatieproces van sociale innovaties in sociale ondernemingen. Op basis van de belangrijkste strategieën en activiteiten die in hoofdstuk 3 werden geïdentificeerd, was het mogelijk om een vragenlijst te ontwikkelen die beoordeelt in welke mate sociale ondernemers zich bezighielden met de dimensies van verantwoorde innovatie tijdens de ontwikkeling van hun innovatie. Ashoka-fellows (vooraanstande sociaal ondernemers) werden benaderd om de vragenlijst in te vullen, wat resulteerde in 39 vragenlijsten die geschikt zijn voor verdere kwantitatieve analyses. Er vond average-linkage hyrarchical clustering plaats om clusters van sociale ondernemers te identificeren op basis van de kenmerken

van hun innovatieproces. Niet-parametrische testen werden uitgevoerd om de kenmerken van de innovatieprocessen te identificeren die clusters van elkaar onderscheiden. Op basis van deze kenmerken was het mogelijk vier typologieën van innovatieprocessen binnen sociaal ondernemerschap te identificeren en te beschrijven (dat wil zeggen *rushing, wayfinding, rigid visionary* en *negotiating visionary* sociale ondernemers). Elke ingevulde vragenlijst werd aangevuld met een profielbeschrijving van de sociale ondernemer (verkregen uit de Ashoka-database), waarmee contextuele factoren konden worden geïdentificeerd die de resultaten van kwantitatieve analyses kunnen helpen verklaren. Dit betekent dat dit hoofdstuk een mix van kwantitatieve en kwalitatieve methoden heeft aangenomen.

De resultaten laten zien dat er vier verschillende typen sociaal ondernemers bestaan met betrekking tot het proces hoe zij hun oorspronkelijke ideeën omzetten in innovatieve oplossingen voor maatschappelijke problemen. Ze houden zich tot op zekere hoogte bezig met het ontwikkelen van hun innovatie op basis van een visie, en hebben deliberatieve vormen van stakeholderbetrokkenheid. Dit geldt ook voor de rushing sociale ondernemers die zich niet echt bezighielden met de overige dimensies: reflexiviteit, reactievermogen en kennisbeheer. De *wayfinders* houden zich bezig met alle dimensies van verantwoorde innovatie, maar hun innovaties werden niet echt geleid door een specifiek plan, en er waren ook geen alternatieve scenario's voor de ontwikkeling van hun sociale innovatie. Ze zijn reflexief, ze evalueren vooral of de besluitvorming in overeenstemming is met hun eigen normen, waarden en overtuigingen. De *rigide, visionaire sociale ondernemers* lijken een duidelijk plan te hebben om een maatschappelijk probleem aan te pakken dat gebaseerd is op bepaalde normen en waarden die hun besluitvorming bepalen. Ze betrekken stakeholders in hun innovatieproces en bevorderen discussies over de innovatie, maar tegelijkertijd zorgen ze ervoor dat ze de ontwikkeling van de innovatie in de hand houden. Vandaar dat de uitkomsten van het innovatieproces niet afwijken van hun oorspronkelijke ideeën. De '*negotiating visionary' ondernemers* hebben ook een duidelijk plan om de innovatie te ontwikkelen, namelijk een oplossing te ontwikkelen die het sociale probleem aanpakt in samenwerking met hun stakeholders die daarbij daadwerkelijk beslissingsbevoegdheid hebben. Ze evalueren zelden of de besluitvorming in overeenstemming is met hun eigen normen, waarden en vertuigingen.

De eerste conclusie die kan worden getrokken, is dat zowel de negotiating visionaries alsook de rigid visionary ondernemers allebei hun innovaties ontwikkelen aan de hand van een duidelijke visie die voorafgaat aan intenties en daaropvolgende acties (Waddock & Steckler 2016). De procedurele aanpak is het meest te herkennen in het innovatieproces van de negotiating visionary van sociale ondernemers, terwijl de rigid visionaries een meer normatieve substantieve benadering van innovatie lijken te hanteren. Het verschilt daarom van geval tot geval welke dimensies van verantwoord innoveren dominant zijn tijdens de ontwikkeling van innovaties die maatschappelijke problemen het hoofd willen bieden. Het procedurele framework voor verantwoorde innovatie moet daarom niet worden beschouwd als een one size fits-all-model om verantwoorde innovaties te ontwikkelen, aangezien andere benaderingen ook tot wenselijke innovatie-uitkomsten hebben geleid in de onderzochte ondernemingen. Wat de contextuele analyses betreft, bevestigt dit onderzoek de bevindingen van Waddock en Steckler (2016) dat de meeste sociale ondernemers "vormende ervaringen" hebben die aanleiding geven tot de wens om een verschil in de wereld te willen

maken. Andere contextvariabelen (bijvoorbeeld marktoriëntatie, eerdere ervaring, organisatiestructuur) hebben de verschillen tussen de typologieën niet kunnen verklaren.

Hoofdstuk 5: *De facto* verantwoorde innovatie-uitkomsten en schaalvergroting voor impact

Waar de vorige onderzoeksdoelstelling voornamelijk gericht is op de procesdimensie van verantwoorde innovatie, richt hoofdstuk 5 zich op de productdimensie (d.w.z. de innovatie-uitkomsten en hun implicaties). In hoofdstuk 5 wordt onderzocht hoe sociale ondernemers normatieve waarden integreren in hun *de facto* verantwoorde innovaties, en presenteert strategieën om deze innovaties te ontwikkelen, te implementeren en te schalen voor impact. Von Schomberg (2013) suggereert drie normatieve ankerpunten die kunnen worden gebruikt als een kompas voor verantwoorde innovatie-uitkomsten. Hij ontleende deze aan publieke waarden die democratisch zijn overeengekomen en zijn vastgelegd in het EU-Verdrag. Bovendien worden ze gevormd door rechten, beginselen en vrijheden die zijn vastgelegd in het handvest van de grondrechten van de Europese Unie, waaraan wetenschap en innovatie zich moeten houden.

De deelnemers in dit onderzoek waren dezelfde Ashoka-fellows als in hoofdstuk 4, vooraanstaande sociale ondernemers die als 'changemakers' acteren in de samenleving (Mair et al. 2012). Ashoka geeft een profielbeschrijving (ongeveer 2100 woorden) voor elk van hun sociaal ondernemers, die informatie bevat over het probleem, de nieuwe innovatieve oplossing, de gevolgde strategie en persoonlijke informatie over de sociale ondernemer. Er waren 42 profielbeschrijvingen die zijn onderworpen aan een kwalitatieve analyse, deze zijn gebaseerd op een coderingsschema dat is afgeleid uit het handvest van de grondrechten van de EU. Bovendien is de analyse van de soort activiteiten van de sociale ondernemers, en de principes achter de oplossing, geanalyseerd met coderingsschema's die al zijn ontwikkeld, getest en gepubliceerd in Mair et al. (2012).

De resultaten tonen aan dat sociale ondernemers meer dan één recht, beginsel of vrijheid integreren in hun innovatie (bijvoorbeeld het recht van ouderen samen met het recht op preventieve gezondheidszorg), en vaak meer dan één categorie van het handvest van de grondrechten van de Europese Unie behandelen (bijv. Waardigheid, Solidariteit of Gelijkheid). De geïntegreerde rechten, principes of vrijheden zijn vaak direct gerelateerd aan het maatschappelijke probleem of verwaarloosde sociale behoeften, terwijl tegelijkertijd de sociale ondernemers kansen zien om aanvullende rechten, principes en vrijheden te integreren. Bovendien proberen ze proactief barrières weg te nemen die de hulpbehoevenden ervan kunnen weerhouden om de mogelijke oplossing aan te nemen. De eerste conclusie die kan worden getrokken is da sociaal ondernemers "directe sociaal-ethische waarde" willen creëren voor de hulpbehoevende. De innovaties die ze ontwikkelden zijn echter niet uniek, het zijn systeemvormende oplossingen die bestaan uit verschillende onderliggende, en onderling gerelateerde, innovaties. De sociale ondernemingen passen deze systeemvormende oplossing toe, ze schalen deze op hun eigen manier, en coördineren vaak collectieve actie van stakeholders om de innovatieve oplossing te implementeren en te schalen.

Het werken met een testfase van de innovatie, en evalueren of het efficiënt en effectief is in het oplossen van het maatschappelijke probleem, is gebruikelijk bij de sociale ondernemingen in de steekproef.

Sociale ondernemers beginnen met schaalvergroting wanneer de uiteindelijke innovatie efficiënt en effectief blijkt te zijn in het oplossen van het sociale probleem of het aanpakken van de sociale behoeften. Ze verspreiden de innovatie onder andere organisaties om de impact te vergroten, ze zijn gericht op het verder verbeteren van de innovatie voor het creëren van betere sociale impact, of ze spreken nieuwe eindgebruikers aan of gebruiken de innovatie voor een ander probleemveld. Uiteindelijk worden de echte 'change makers' in de steekproef betrokken bij beleidsvorming, waardoor hun bottom-up processen worden gecombineerd met top-down gedreven veranderingen in de samenleving. De conclusie die kan worden getrokken is dat sociale ondernemers deelnemen aan radicaal incrementalisme, wat wordt voorgesteld als een van de manieren om het 'dilemma of control' aan te pakken (van de Poel 2016). De focus op het creëren van directe maatschappelijke waarde, het belang van het coördineren van collectieve actie en het realiseren van radicaal incrementalisme, wordt vertaald in een model voor verantwoorde innovatie waarbij bottom-up innovatie en schaalvergroting voor systeemveranderingen centraal staat.

Sociale ondernemers streven naar het creëren van maatschappelijke waarde terwijl ze bedrijfslogica van efficiëntie (André & Pache 2016) adopteren, waardoor ze de sociale impact kunnen behouden en maximaliseren. Dit wordt ook duidelijk door het belang wat zij hechten aan niet alleen het ontwikkelen van de innovatie maar ook de implementatie en het opschalen van de innovatieve oplossing. Blok en Lemmens (2015) hebben een uitgebreide lijst gegeven van factoren die de implementatie van verantwoorde innovatie in een bedrijfscontext belemmeren. Uit de bevindingen kan echter worden afgeleid dat de bedrijfslogica ook een kans kan zijn voor het concept verantwoord innoveren om aan het ambitieniveau te voldoen wat de gemeenschap zich heeft gesteld, namelijk innoveren *voor* de samenleving. Het huidige concept van verantwoorde innovatie richt zich voornamelijk op de ontwikkeling van innovatie, terwijl de gevallen van sociaal ondernemerschap aantonen dat implementatie en schaalvergroting cruciaal zijn om impact te creëren voor de samenleving. Verantwoord innoveren moet daarom ook deze latere stadia omvatten, niet alleen om haar ambitie waar te maken maar ook omdat schaalvergroting niet inherent goed is (André & Pache, 2016); schaalvergroting kan leiden tot situaties waar ethische principes conflicteren.

Conclusies

Verantwoord innoveren in een bedrijfscontext houdt in dat men oplossingen vind voor complexe maatschappelijke uitdagingen, bijvoorbeeld gerelateerd aan klimaatverandering, vergrijzing of sociaaleconomische ongelijkheden, maar ook andere maatschappelijke problemen of dringende sociale behoeften. De innovatieve oplossingen zijn veelal geen afzonderlijke innovaties. De theoretische en empirische studies tonen beide aan dat verantwoorde innovaties vaak systeemoplossingen zijn die bestaan uit verschillende onderliggende en onderling gerelateerde innovaties. Bovendien zijn deze onderliggende innovaties niet alleen maar technologische innovaties aangezien ze ook de vorm kunnen aannemen van proces-, product- of bedrijfsmodelinnovaties. De systeemoplossingen als antwoord op grote uitdagingen vereisen vaak gecoördineerde collectieve actie van stakeholders (George et al. 2016) die ook duidelijk naar voren komen in het empirische deel van dit proefschrift. Uit de casestudies blijkt dat het bedrijf die de

verantwoorde innovatie initieert vaak de coördinator is van dergelijke collectieve acties van belanghebbenden. Dit vereist dat zij een meer open innovatieproces aangaan, maar dit is niet hetzelfde als een transparant innovatieproces.

Hoewel sociale ondernemingen anders zijn dan op winst gerichte ondernemingen, tonen de casestudies wel aan dat verantwoorde innovaties *kunnen* worden ontwikkeld, geïmplementeerd en geschaald in een bedrijfscontext. Hun strategieën om normatieve waarden te integreren in innovaties kunnen bedrijven met een winstoogmerk inspireren om ethiek ook in hun innovaties te integreren. Verantwoord innoveren in een bedrijfscontext (door zowel sociale alsook winstgerichte ondernemers) vereist daarom strategieën om normatieve waarden te integreren in innovatieve oplossingen voor maatschappelijke uitdagingen, en met het doel om elke mogelijke schending te voorkomen van de rechten, principes of vrijheden die in de EU-verdrag zijn vastgelegd en het handvest van de grondrechten van de Europese Unie (Ruggiu 2015). Het integreren van waarden in innovatie vereist echter niet per definitie deliberatie met een representatief netwerk van belanghebbenden om de waarden voor innovatie te bepalen. De systematische literatuurstudie en het empirische gedeelte laten zien dat het cruciaal is om direct met de beoogde hulpbehoevenden in contact te zijn. Verantwoord innoveren kan zich richten op het creëren van directe sociaal-ethische waarde voor de beoogde hulpbehoevende, wat kwetsbare gemeenschappen in de samenleving kunnen zijn. Verantwoorde innovaties kunnen meer impact hebben op de samenleving als proactief wordt gezocht naar manieren om obstakels voor innovatie-acceptatie weg te nemen, met name voor de hulpbehoevenden.

Hoewel de indruk kan worden gewekt dat verantwoorde innovatie hier is gepresenteerd als een rigide en lineair innovatieproces moet het echter niet als zodanig worden geïnterpreteerd; dit omdat innovaties in de praktijk vaak van meer heterogene aard zijn. Het empirisch onderzoek van *de facto* verantwoord innoveren in sociaal ondernemerschap toont bijvoorbeeld aan dat bedrijven op verschillende manieren innovaties kunnen ontwikkelen die de maatschappij ten goede komen. Dit betekent dat verantwoorde innovatie in een bedrijfscontext niet kan worden beschouwd als een 'one size fits all-model' om initiële ideeën voor innovatie te vertalen naar daadwerkelijke oplossingen die inspelen op maatschappelijke uitdagingen. Bovendien draait verantwoord innoveren in een bedrijfscontext niet alleen om de procesdimensie.

Het innovatieproces moet gepaard gaan met implementatie en daaropvolgende schaalvergroting om de impact te maximaliseren. De ontwikkeling en implementatie kan op kleine schaal worden uitgevoerd (bijvoorbeeld op gemeenschapsniveau), waar verantwoorde innovaties vervolgens kunnen worden getest en getest op hun effectiviteit en efficiëntie. Als de innovatie de gewenste implicaties lijkt te hebben, kan deze vervolgens worden geschaald om grootschalige impact op de samenleving te genereren. Bovendien kan dit legitimiteit creëren voor de sociale ondernemer om deel te nemen aan beleidsvorming, en daarbij top-down maatschappelijke verandering tot stand te helpen brengen. Verantwoorde innovaties in een bedrijfscontext kunnen daarom worden ontwikkeld op basis van radicaal incrementalisme, wat wordt voorgesteld als een strategie om het 'dilemma of control' te overwinnen (van de Poel 2016).

In de inleiding van dit proefschrift wordt beargumenteerd dat bedrijfslogica waarschijnlijk conflicteren met de implementatie van verantwoord innoveren. De eindconclusie is echter dat de

bedrijfslogica ook kansen kan bieden op het gebied van verantwoorde innovatie. De bedrijfslogica dringt aan op een focus op het implementeren van de innovatie en schalen voor impact. Ze vormen daarom een kans voor het concept van verantwoord innoveren en om te voldoen aan haar ambitie om te innoveren *met* de maatschappij en *voor* de maatschappij.

About the author

Rob Lubberink was born on January 28, 1989, in Hengelo. After finishing fundamental education, Rob obtained a bachelor's degree in management and consumer studies at Wageningen University. Thereafter, he obtained the Research Master Variant degree in management, economics and consumer studies at Wageningen University. In 2013, he started his PhD trajectory, which was part of a Climate-KiC funded research project, at Wageningen University & Research at the Management Studies group.

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Lubberink, R.; Blok, V.; van Ophem, J.A.C.; Omta, S.W.F. *Responsible Innovation of Social Entrepreneurs: Opening the Black Box of Social Entrepreneurial Innovation Processes*. Paper presentation at the Sustainability, Ethics and Entrepreneurship conference, Denver, United States, May 16th through May 18th, 2016.

Lubberink, R.; Blok, V.; van Ophem, J.A.C.; van de Velde, G.; Omta, S.W.F. *Responsible Innovation in the Context of Social Entrepreneurship*. Paper presentation at the 1st IESE-LUISS Conference on Responsibility, Sustainability and Social Entrepreneurship, Rome, Italy, 18-19 April 2017.

Lubberink, R. *Responsible Innovation*. Guest Lecture at Open University: colloquium on Innovation within the agri & food sector, Thursday 17th of November, 2016.

Rob Lubberink
Wageningen School of Social Sciences (WASS)
Completed Training and Supervision Plan

Name of the learning activity	Department/Institute	Year	ECTS*
A) Project related competences			
Systematic approaches to reviewing literature	WGS	2014	4.0
Project and Time Management	WGS	2014	1.5
Scientific writing	WGS	2016	1.8
New perspectives on the urban and the rural: spatial thinking in the social sciences	WASS	2015	4
Writing research proposal	WASS	2013	6
B) General research related competences			
Introduction course	WASS	2013	1
'Responsible Innovation in the Context of Social Entrepreneurship'	1st IESE-LUISS Conference on Responsibility, Sustainability and Social entrepreneurship. Rome, Italy	2017	1
'Responsible Innovation of Social Entrepreneurs: Opening the Black Box of Social Entrepreneurial Innovation Processes'	Sustainability, Entrepreneurship & Ethics Conference. Denver, United States	2016	1
'Definitions and operationalisations of responsible innovation dimensions in the business context: A systematic literature review'	4th International MVI Conference Responsible Innovation: a European Agenda? The Hague, The Netherlands	2015	1
'The Social, the Transformational AND the Responsible? The Extent to Which Social Enterprises Take Responsibility Into Account in Innovation'	WICaNeM conference 2014: Sustainability and Innovation in Chains and Networks. Capri, Italy	2014	1
Reviewer of peer-reviewed articles	Sustainability & The Journal of Business Ethics	2017	1
C) Career related competences/personal development			
Secretary of a peer-reviewed journal	the Journal on Chain and Network Science	2015-2016	1
Responsible Innovation Workshop	Open University Utrecht	2016	0.5
PhD competence assessment	WGS	2014	0.3
the Journey: climate innovation summer course	Climate-KiC	2013	6
Sustainable Cities PhD Summer Course	Climate-KiC	2015	3
Teaching and supervising students	WUR	2014-2016	2
Guest researcher	Fraunhofer Center for Responsible Research and Innovation (CeRRI)	2017	1
Total			**37.1**

*One credit according to ECTS is on average equivalent to 28 hours of study load

Citation of sponsors

Cover Design

The cover has been designed by Carleen Laloli in consultation with the author of this PhD thesis.

There are two messages that this cover aims to represent. First, in times of darkness one should not forget to search for the light. Here, the light represents the social entrepreneurs who searched for, and found, a light for their target beneficiaries. The rose stands symbol for these target beneficiaries who are often vulnerable people or communities, who needed a light in which they could flourish. Second, it represents the ambition of responsible innovation, which is to innovate with the stakeholders instead of innovating in isolation. In other words, it aims to search for the light so that stakeholders and the public who may be affected are not being kept in the dark.