13 The responsible side of innovation

Towards the measurement of a new construct

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13.1 Introduction

Innovation relates to developing new products and services, production methods and procedures, production technologies, and to administrative changes. Not only does innovation allow for the general improvement of the quality of life, it is also the motor of economic progress, which is motivated by the desire of companies to gain competitive advantage. As such, innovation is essential for many companies (Amabile, Conti, Coon, Lazenby, & Herron, 1996). In a business context, innovation relates to the intentional adoption of new ideas, processes, products or procedures within organizational units in order to improve the current organization or wider society (West & Farr, 1990). As Damanpour (1991) notes, the field of innovation is broad, and distinctions can be made between the diffusion and adoption of innovations in the market versus organizational innovating and innovativeness. Here, we regard innovation as ‘a process of turning opportunity into new ideas and of putting these into widely used practice’ (Tidd, Bessant, & Pavitt, 2005, p. 66).

For the last two decades, the ethical dimension of innovation has attracted the attention of various scholars; it features as an important topic of discussion under the heading of Responsible Research and Innovation (RRI, e.g. Guston, 2014; Guston et al., 2014; Hellström, 2003; Lubberink et al., 2017; Van den Hoven, 2007; Van de Poel, 2014). In spite of its growing importance and relevance for the practice of innovation, however, RRI seems almost invisible in business contexts (Blok & Lemmens, 2015; Lubberink et al., 2017). The current literature on RRI is dominated by conceptual pieces on the nature of RRI (e.g. Stilgoe et al., 2013) and writings on its societal importance (e.g. Van den Hoven, Lokhorst, & Van de Poel, 2012), while less work seems to be done on applying RRI as business practices in organizations. In this chapter, we aim to address this gap by providing a measurement scale for assessing RRI on the level of employees in business contexts, particularly in business contexts where innovations are most likely to occur (Baregheh, Rowley, & Sambrook, 2009; Foley et al., 2016).

In innovation-driven firms, employees are instrumental in order to attain organizational success. They do so through their ability to generate ideas,

and use their creative self-efficacy to develop new and better products, services and work processes. In other words, it is through their innovative work behaviour that employees attain innovation outcomes (e.g. De Jong & Den Hartog, 2010; Richter, Hirst, Van Knippenberg, & Baer, 2012). Janssen (2000, p. 228) defines innovative work behaviour 'as the intentional creation, introduction and application of new ideas within a work role, group or organization, in order to benefit role performance, the group, or the organization'. Ideas are generally the building blocks of innovation. Therefore, innovative work behaviour includes behaviours related to the generation of ideas, idea promotion and the realization or implementation of ideas.

In addition, and related to innovative work behaviour, the more general proactivity of employees affects organizational success (e.g. Botero & Van Dyne, 2009; Parker, Williams & Turner, 2006). Especially in innovative organizations, in which novel and unpredictable situations are likely to occur, employees need to proactively solve problems and speak up when needed. Proactivity in a corporate setting is defined as constructive and anticipatory work behaviour which is intended to be functional (Crant, 2000). Proactive employees show goal-oriented behaviour at work, explore opportunities and speak up with concerns and suggestions for improvement (Crant, 2000; Grant, 2013; Grant & Ashford, 2008). While innovative work behaviour is specifically focused on generating, championing and implementing new ideas, we view proactivity as taking charge, which is defined as the voluntary and constructive efforts of employees to effect organizationally functional change in how work is executed within the context of their jobs, work units or organizations (Morrison & Phelps, 1999).

Since employees differ in their ability to explore novel and useful ideas, a number of individual differences measures to assess innovation performance on the individual level were developed. Much of this work highlights creative achievements (e.g. Carson, Peterson, & Higgins, 2005; Runco, Plucker, & Lim, 2001) or focuses on innovative behaviour (e.g. De Jong & Den Hartog, 2010; Jansen, 2000), without considering the ethical dimensions as stressed by the RRI literature. Here, we aim to provide such an elaboration of RRI while still focusing on behavioural aspects or the attributes of individual employees. The chapter is structured as follows. First, we will explore RRI in relation to business activities on the basis of a more elaborate literature review. Next, we will translate the findings of this literature study into relevant items for assessing RRI. Then, we will compose a measurement scale and refine this measure through an empirical study among a sample of $n = 244$ students. We will conclude the chapter with the implications of the RRI measures for both theory and practice.

13.1.1 Creativity and responsibility

Creativity is an important and established research domain in contemporary behavioural research, as expressed in handbooks (cf. Kaufman &

Sternberg, 2006, 2010; Paulus & Nijstad, 2003; Smith, Ward, & Finke, 1995; Sternberg, 1999; Zhou & Shalley, 2008) and even an encyclopaedia (Runco & Pritzker, 2011). Most researchers in the field follow the standard definition of creativity, which considers creativity as consisting of novelty (or originality) and usefulness (fit or appropriateness). This standard definition was first coined by Stein in 1953 (see Runco & Jaeger, 2012), but has primarily become popular through the seminal work of Harvard professor Teresa Amabile (1983, 1996).

Over the past 25 years, scholars have increasingly sought to gain insights on creativity in the moral domain. A special issue in the *Creativity Research Journal* in 1993 inspired a research agenda aimed at increasing the understanding of moral creativity as a responsible creativity aimed at responding to societal, scientific and technological dilemmas with moral integrity (Gruber, 1993; Runco & Nemiro, 2003). In this special issue, several authors pointed to the existence of a darker side of creativity, characterized by a focus on societally undesirable novel outcomes (cf. McLaren, 1993). These contributions set the stage for exploration of negative – or even mal-evolent – creativity as the intentional production of novel solutions that deliberately aim at causing harm or immoral results (Clark & James, 1999; Cropley, Kaufman, & Cropley, 2008; Harris, Reiter-Palmon, & Kaufman, 2013; James, Clark, & Cropanzano, 1999).

The 1993 special issue also inspired a research agenda aimed at increasing the understanding of moral creativity as a *responsible creativity* focused on responding to societal, scientific and technological dilemmas with moral integrity. McLaren (1993) described it as: '[creativity] cannot be fully understood, any more than ... any other human endeavor, apart from its socio-moral context and intent' (p. 142). Scholars on moral creativity, indeed, all point to the need to account for goal-directedness (Clark & James, 1999; James, Clark, & Cropanzano, 1999) or intentionality (Runco & Nemiro, 2003) during the creative act. Haste (1993) argued that a moral creative act is about 'an unusual vision of moral seriousness of the situation [that fuels] the individual's own sense of efficacy and personal responsibility' (p. 3). Thus, it is a person's intention to make a difference in a responsible way, together with that person's *efficacy* – i.e., the self-perceived belief of being capable of setting in motion some intended course of action (Bandura, 1997) – that constitute the behavioural underpinnings of moral creativity. In addition, James and colleagues (1999) suggest that the type of (positive or negative) creativity a person will be inclined toward probably depends on individual differences in a person's personality (see Harris et al., 2013; Lee & Dow, 2011, for a similar point). Taken together, these considerations suggest that a scale for measuring the behavioural aspects of RRI practices can be established by reworking existing scales for creativity – especially those containing an element of self-efficacy together with creativity – in such a way that they also explicitly take into account ethical concerns at work. However, insights from the current RRI literature could be relevant to our

aim to design a measurement scale to assess RRI. Therefore, we will start by extracting the business implications in relation to the dimensions of RRI in order to explore its relevance for the design of our measure.

13.2 The relevance of the dimensions of Responsible Research and Innovation for moral creativity

The current literature on RRI focuses strongly on the creation of new knowledge rather than on the overall innovation process in business contexts where new products, services or business models are developed by people in organizations. Here, we will extract the business implications in relation to the dimensions of RRI – i.e., anticipation, reflexivity, inclusion, and responsiveness as put forward by Owen et al. (2013). The rationale for this approach is that these four dimensions comprise the most commonly used framework in the field of RRI.

13.2.1 Anticipation

‘Anticipation’ refers to the ability to foresee possible consequences of innovation (Asante, Owen, & Williamson, 2014; Owen et al., 2013; Stilgoe, Owen, & Macnaghten, 2013) and implies reflection about both the desired and undesired (technical, political and environmental) impacts that may result from innovations (cf. Guston, 2014; Pesch, 2015). Anticipation does not only articulate promising narratives of expectation, but also prompts scientists and innovators to think of ‘what if ...’ and ‘what else might it do?’ questions. Therefore, anticipation is needed to ‘articulate and assess expectations in science and technology’ and see ‘the difference between looking into the future and looking at the future’ (Borup, Brown, Konrad, & Van Lente, 2006, p. 296).

In a business context, anticipation implies that a company needs to determine the impact of innovation activities. According to Lubberink et al. (2017), this requires a company to engage in activities that will improve knowledge about the innovation context by monitoring the innovation environment (Chadha, 2011; Gaziulusoy, Boyle, & McDowall, 2013). Next, a company needs to determine the impact of innovation, including its unanticipated consequences. Again, the company can reduce the uncertainties of innovation by monitoring the innovation environment (Berker, 2010; Biondi, Iraldo, & Meredith, 2002; Chadha, 2011; Rohrbeck, Konnertz, & Knab, 2013). This enables a company to assess the risks, uncertainties and impact of innovations as perceived by the stakeholders, such as the regulatory risks (e.g. corruptive culture of bureaucratic procedures and regulation instability), political risks (e.g. low political instability and lack of support from local government) and even *force majeure* (e.g. natural disaster and terrorism). Such risks and uncertainties are usually assessed by elaborate decision-making models (Wang, Chan, Yee, & Diaz-Rainey, 2012).

This short overview of business aspects related to the dimension of anticipation shows a strong emphasis on the (undesirable) impacts of innovation processes. Subsequently, the suggested measures involve the way in which both foreseeable and unforeseeable impacts may be effectively coped with by installing appropriate organizational structures and activities. These measures involve tools and models, but do not include any behavioural characteristics of the people who engage in a responsible way.

13.2.2 Reflexivity

The reflexivity dimension is aimed at making values and beliefs in innovation processes more explicit in order to enable adaptation when necessary. Reflexivity usually requires collaboration approaches, such as the involvement of the public (Asante et al., 2014; Flipse, Van Dam, Stragier, Oude Vrielink, & Van der Sanden, 2015; Macnaghten & Chilvers, 2014). In order to evaluate current and previous actions with regard to achievement of the desired innovation outcomes formal evaluations, third-party critical appraisal or an informal (self-) assessment should be ensured. Also, employee empowerment is needed in order to create innovations that are more in line with environmental needs by having regular staff meetings, managing internal selection and enabling new knowledge creation (Muduli, Govindan, Barve, Kannan, & Geng, 2013).

When a company is involved with innovation, conflicting values may arise (Lubberink et al., 2017). It is essential to prioritize values and motivations before thinking about the impact of these on innovation. For example, if a company values sustainability, different innovation governances, such as a democratic organizational structure, innovation workshops or an innovation task force, may be needed in order to gain the desired sustainability outcomes (Ayuso, Ángel Rodríguez, & Enric Ricart, 2006). A third aspect of reflexivity concerns the way in which a company may critically assess the way its knowledge could impact innovation processes (Lubberink et al., 2017). Companies should carefully analyse the presence, absence and subjectivity of information. In other words, a company ought to reflect and reframe perceived realities. This also relates to the perceived realities of different actors, which calls for reconciling the conflicting information resulting from these different realities.

By involving stakeholders with different perspectives, a company can expand its reflexive capacities and also further improve capabilities to sustain growth (Vickers & Lyon, 2014). Also for the dimension of reflexivity, a re-articulation into elements relevant for a business context shows a strong emphasis on process characteristics. These characteristics are found beneficial for creating responsible innovation outcomes. In its core, collaborative structures aimed at facilitating interaction among relevant stakeholders within a corporate setting are suggested as the designated route towards reflexivity.

13.2.3 *Inclusion*

Often, the notion of inclusion is used interchangeably with that of deliberation. In the context of businesses, these two notions are sometimes separated (Pellé & Reber, 2015), as stakeholder inclusion can have conflicting goals with stakeholder deliberation (Papadopoulos & Warin, 2007). The twin dimensions of inclusiveness and deliberation pertain to the interrelations with other agents. The dimensions respectively serve to identify the values which with an innovation might become more societally acceptable or responsive and to the entertainment of stakeholder dialogues. As such, a company's 'licence to operate' may be supported.

In this, 'inclusion' is aimed at engaging different stakeholders in the early stage of innovation processes, such as in the involvement of public values (Bozeman, Rimes, & Youtie, 2015; Taebi et al., 2014). Public values would encompass the outcomes that are important to the public at large. In a business context, inclusion implies the involvement of various stakeholders, such as the wider public. Also, a company may be encouraged to attract and collaborate with experts (cf. Baba & Walsh, 2010), but it could also team up with governmental agencies (Carrillo-Hermosilla, del Río, & Könnölä, 2010).

An important aspect of inclusion is to raise stakeholders' commitment and contribution (Le Ber & Branzei, 2010). Transparency is central here and requires a clear communication about the costs and benefits of the different stakeholders (De Chiara & Russo Spena, 2011). Clear and open communication implies several costs, such as guarding business secrets, reducing community entry barriers, giving up control and organizational inertia (Stuermer, Spaeth, & Von Krogh, 2009). Therefore, many companies selectively apply openness as they are aware that such openness would not always improve innovation performance (Balka, Raasch, & Herstatt, 2014).

'Deliberation' is defined by Van de Kerkhof (2006, p. 282) as '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'. This implies that stakeholder inclusion emphasizes questions about which actors should be involved, when to involve them and whether the actors represent the relevant stakeholders. Deliberation does not take much attention of the challenges of inclusivity and stakeholders' representativeness. Being deliberative refers to a sustained interaction between stakeholders in the whole innovation process (Jasanoff, 2003; Parkhill, Pidgeon, Corner, & Vaughan, 2013).

In order to implement deliberative governance, companies could engage in various ways of dialogue, such as crowdsourcing (Franke, Keinz, & Klausberger, 2013), focus group discussions (Dossa & Kaeufer, 2014) or community visits (Chadha, 2011). Companies might develop so-called dialogical relations by formalizing the process of deliberation governance (Asif,

Searcy, Santos, & Kensah, 2013; Harrison, Chaari, & Comeau-Vallée, 2012). It is important to note that the dialogue should not be seen as an attempt to influence or coerce one another, but it emphasizes that one party should listen to other parties with empathy and should focus on the common goals with the intention of coming up with solutions (Ayuso et al., 2006).

13.2.4 Responsiveness

The ‘responsiveness’ dimension concerns the response to new knowledge, different emerging perspectives, views and norms (Stilgoe et al., 2013). Responsiveness is needed because the efforts to involve the public in innovation processes are limited. Therefore, the risk that the innovation could lead to undesired impacts is growing. Von Schomberg (2013) argues that the challenge of responsible innovation is to improve responsiveness to societal challenges. Also, Maynard (2015, p. 199) explains that innovators are likely to be blinkered by their optimism – especially regarding the ‘seemingly speculative future health, environmental and other societal impacts [that] look like an ill-affordable luxury’.

While innovating, a company may obtain new information from the external environment that requires adjustments to the innovation process. This could imply that the company will try to avoid unintended consequences through incremental improvement (Berker, 2010). In this case, the company applies careful adaptation to achieve the best possible results. The development of a platform strategy is also increasingly proposed as a way to create product architecture that allows for many (customizable) design variants (Evans, Partidário, & Lambert, 2007). By implementing such a customization strategy, the company can maintain the production costs, the quality and the delivery of the products based on consumers’ needs (Trentin, Perin, & Forza, 2012). Like the other dimensions of RRI, the recommendations distilled here suggest a focus on how to structure organizational processes in such a way that they contribute to an innovation outcome that is desirable.

13.3 Findings

Our review of RRI literature highlights the need to account for novelty and ethical aspects in innovation (Barron & Harrington, 1981; King, Walker, & Broyles, 1996) and strengthens our goal to develop a suitable measure for people involved with the creation of new products, services or business models in organizations. Although our findings show some clear business implications in relation to the dimensions of RRI, our review of the RRI literature indicates that these suggested links are primarily focused on *process* characteristics. Research in this emerging paradigm has primarily addressed the question about how to make innovations responsible (Koops, 2015) – i.e., the main focus in the community is on the steps through which an innovative end product eventually becomes ‘what it ought to be’. RRI can

therefore be seen as a cognitive precursor to the ethically driven novelty-producing behaviours of different actors in the innovation process.

The strong focus does seem to neglect a number of other relevant concerns (see Cuppen et al., 2019 for an overview). For business contexts the most notable neglect may be that employees are important drivers of innovation, but the role of behavioural factors of such employees (attitudes and competencies) is almost completely neglected by the work on the RRI dimensions. Therefore, we are motivated to derive the relevant behavioural characteristics that can be connected to responsible innovation. In the next section, we will present the construct of ‘responsible creativity and innovation’ and develop a measure to highlight the responsible side of innovation in organizations.

13.4 Development of the responsible creativity and innovation scale

In order to develop a measurement instrument for assessing responsible creativity and innovation on the level of employees in business contexts, we started from the definition of responsible innovation, and supplemented this with a literature on moral creativity at work (as outlined in the previous section). Below, we will first describe how these two literatures informed the development of a preliminary pool of items. Next, we will discuss how we arrived at a validated final measurement instrument.

As discussed above, creativity theoretically refers to the originality and usefulness, fit or appropriateness of a product or idea (Amabile, 1983, 1996; Runco & Jaeger, 2012). In line with this standard definition of creativity, researchers have developed several individual difference measures to explore to what extent a person performs more creatively in creative task settings (cf. the Creative Achievement Questionnaire and the Ideational Behavior Scale; Carson, Peterson, & Higgins, 2005; Runco, Plucker, & Lim, 2001). Most measures focus on the first stage of the creative process – idea generation – thus overlooking the implementation stage, where creative ideas are transformed into innovation (West, 2002), such as novel organizational arrangements, products, services or business models. This is also true for the three-item creative self-efficacy (CSE) construct, which was explicitly developed to capture an employee’s self-reported motivation and ability to perform creatively at work (Tierney & Farmer, 2002). CSE is a predictor of individual creativity at work (cf. Tierney & Farmer, 2004, 2011), but has also been shown to predict individual creativity within the broader corporate setting of larger research and development teams (Richter et al., 2012).

Janssen (2000) takes a broader perspective and defines innovative work behaviour as related to idea generation, idea promotion and eventually the overall implementation of such ideas. First evidence exists that creativity and innovation are related to ethical business practices of individuals and groups (Valentine, Godkin, Fleischman, & Kidwell, 2010). Inspired by the

economical nature of the CSE, the added focus on goal-directedness / intentionality in moral creativity (see above), as well as the work on innovative work behaviour, we generated items that explicitly captured the ethical appropriateness of novel ideas and their applications. Next, we formulated items to assess a person's moral considerations during the implementation of creative ideas in organizations. This led to a preliminary pool of 12 items intended to capture an employee's self-efficacy for responsible creativity and innovation at work. Each item was measured on a seven-point scale, ranging from 1 (very strongly disagree) to 7 (very strongly agree).

The preliminary pool of 12 items was tested among a sample of bachelor students, who were enrolled in an applied statistics course at a business school in The Netherlands. Participating students did not receive any reward (no class credit, no financial benefits) for participating in this online survey. Participation was voluntary (they could withdraw from the study at any point in time) and their confidentiality was assured. A total of 244 students (90 male; 154 female; age = 21.09 years; $SD = 1.38$) participated. Following the recommendations by Reise, Waller and Comrey (2000), we specifically targeted bachelor students for our pilot test, since the standard pool of undergraduates tends to be characterized by heterogeneity in terms of traits and background.

The following steps were taken in order to refine our measure. First, we explored the inter-correlations between the 12 preliminary items. Table 13.1 offers the descriptive statistics and correlations for each item, and indicates that each variable had a large number of significant inter-correlations (with the exception of item 11). This tentatively hinted at the possibility that most of the items belong to an overarching construct (Hair et al., 2014). In order to ensure that the items are part of an overarching construct, we applied Bartlett's test of sphericity. This test allows for checking the assumption that 'the correlation matrix has significant correlations among at least some of the variables' (Hair et al., 2014, p. 102). The significant result in our case, $\chi^2(66) = 1036.48, p < 0.0001$, rendered it appropriate for factor analysis in the remaining steps.

Next, we applied a random split half method on the dataset in order to determine a stable factor structure and to enable item reduction for the measured construct. The random split half method assesses the internal consistency of a construct (Hair et al., 2014). We ran a series of 50 random half-sample splits on the full dataset to determine the measure of sampling adequacy. The mean Kaiser–Meyer–Olkin (KMO) value after 50 splits was 0.82, $SD = 0.03$. This value was well within the range that is considered meritorious for further exploratory analysis ($KMO \geq 0.80$; Kaiser, 1974). Following the procedure by Costello and Osborne (2005), we calculated coefficient comparability in a stepwise series of 50 random half-sample splits. This reduced the items from 12 to 8.

In order to refine the factor structure, we conducted an exploratory factor analysis (EFA) on a random half split dataset to derive the using principal

Table 13.1 Descriptive statistics and correlations of 12 preliminary items

	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Item 1	4.71	0.97	–											
2. Item 2	4.55	1.04	0.62**	–										
3. Item 3	3.95	1.41	0.21**	0.34**	–									
4. Item 4	4.20	1.16	0.26**	0.25**	–0.01	–								
5. Item 5	4.25	1.15	0.41**	0.27**	–0.14*	0.48**	–							
6. Item 6	4.43	1.12	0.43**	0.43**	–0.16*	0.47**	0.67**	–						
7. Item 7	4.36	1.13	0.36**	0.31**	–0.04	0.37**	0.38**	0.49**	–					
8. Item 8	4.54	1.24	0.24**	0.20**	0.20**	0.54**	0.36**	0.44**	0.40**	–				
9. Item 9	4.58	1.21	0.34**	0.27**	–0.11	0.29**	0.34**	0.44**	0.23**	0.36**	–			
10. Item 10	4.62	1.08	0.43**	0.36**	–0.12	0.36**	0.47**	0.57**	0.42**	0.38**	0.54**	–		
11. Item 11	4.58	1.40	–0.03	–0.03	0.41**	0.10	–0.07	0.00	–0.09	0.25**	0.09	0.02	–	
12. Item 12	4.95	1.09	0.33**	0.34**	–0.05	0.31**	0.30**	0.37**	0.24**	0.39**	0.46**	0.36**	0.20**	–

Note: $n = 244$. * $p < 0.05$. ** $p < 0.01$.

component analysis with an oblique (direct Oblimin) rotation. This approach is recommended when dealing with behavioural factors, which are typically assumed to correlate (Clark & Watson, 1995). The EFA produced a two-factor solution with Eigenvalues > 1 . The Eigenvalue of the first factor was 3.97 (49.68% of variance). All items loaded on the primary factor, but a single item also loaded strongly on the secondary factor (factor loading > 0.54). We removed this item, which resulted in a stable, single-factor, measurement instrument with a total of seven items. This scale has good overall reliability (Cronbach $\alpha = 0.83$). Table 13.2 offers the final items and descriptive statistics for the responsible creativity and innovation scale.

13.5 Discussion and conclusion

In spite of its growing importance for the practice of innovation, RRI seems almost invisible in business contexts. In order to create awareness among managers and innovators in industry of their responsibility towards society, a clear understanding of the RRI concept is necessary. To provide such an elaboration of RRI, we focused on the attributes of individual employees by paying attention to innovative and ethical behaviour. The aim of this chapter was to show the development of a measure that enables the assessment of responsible innovation on the level of employees who are engaged in work leading to innovation outcomes. Although there are some good measures to evaluate the innovative behaviour of employees, such measures do not include the responsibility dimension, but focus on a person's ability to generate ideas and to develop new and better products, services or business models. One could argue that it would be easy to just add a responsibility measure on top of one of the existing innovative behaviour measures rather than to develop a new scale to capture the RRI of employees. However, the reason why we decided to develop such a new scale is rooted in the fact that we wish to capture the ethical appropriateness of novel ideas and their applications rather than to segregate innovations from responsibility. As such, responsibility should not be entered after the intentional creation, introduction and application of new ideas, but should be embedded into these processes right from the very start. For example, employees involved with innovation should not just be good at generating ideas, but should also be able to capture the responsible side of innovation at the same time.

With the RRI measure, more research can be done in bridging the gap between intended business strategies involving RRI and what employees actually do when creating novel and useful products, services or business models. Such multilevel approaches to study RRI are now possible by applying the RRI measure. It could be very relevant to study RRI of employees in international contexts and to compare employees from different levels and backgrounds. The RRI measure could further feature in studies on the relationship between management practices or leadership styles and innovation outcomes. As such, the RRI measure could also be applied in practice

Table 13.2 Descriptive statistics and correlations of the final measurement instrument

	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.
1. I am good at coming up with ideas that are novel, but also right	4.67	0.96	–						
2. I find it easy to generate original solutions that reflect how the problem at hand ought to be solved	4.59	1.06	0.58**	–					
3. Producing large numbers of solutions for a better future comes naturally to me	4.33	1.08	0.46**	0.28**	–				
4. I am good at generating many ideas that capture the responsible side of innovation	4.56	1.07	0.54**	0.43**	0.65**	–			
5. It is important to me to explore the various ethical aspects of my ideas	4.69	1.16	0.29**	0.25**	0.24**	0.41**	–		
6. Transforming new ideas into useful applications (such as new products, services or business models that make the world a better place) means a lot to me	4.61	1.16	0.47**	0.34**	0.35*	0.45**	0.32**	–	
7. I am good at introducing responsible solutions to a meaningful problem into new organizational arrangements	4.67	1.03	0.56**	0.42**	0.40**	0.57**	0.35**	0.56**	–

Note: $n = 121$. * $p < 0.05$. ** $p < 0.01$.

as this will enable companies to compare different departments on their level of RRI by using aggregated data. The measure could also feature as an outcome for training and development efforts in the area of RRI or be used for the assessment of employees or managers.

Although the properties of the measure are promising, some important next steps are necessary before the RRI measure can be applied in both research and practice. First of all, the measure needs to be further refined. A large-scale follow-up study would be useful to establish the validity and reliability of the measure. Second, although we deliberately used bachelor students in order to secure sufficient heterogeneity of our sample, there could still be the possibility of response bias. Therefore, the final measure needs to be tested among employees who are actually involved with innovation. Third, further analysis is needed in order to establish whether the overall construct of 'responsible creativity and innovation' should be treated as a formative rather than as a reflective (second-order) construct.

In conclusion, our results highlight the importance of an RRI scale for both future research and practice. In spite of its growing importance for the practice of innovation, RRI seems almost invisible in business contexts. By presenting a measure for assessing RRI of employees in business contexts, we open the road for future studies that may further our understanding of the responsible innovation process in practice.

Acknowledgement

The authors would like to express their thanks to Mr Hakim Agung Ramadhan, who first explored our idea to develop a responsible innovation measure in his master thesis in the area of Management of Technology at Delft University of Technology. Through exploring our dataset, Hakim has helped us in refining our thinking and enabled us to take the next steps in the development of the responsible innovation measurement scale.

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