

Green Competences and Responsible Innovation – Exploring the Reciprocity of Concepts Relationship

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Abstract

Purpose: The purpose of the article is to investigate the relation between two novel management concepts: Green Competences (GCs) and Responsible Innovation (RI).

Design/methodology/approach: The research is based on an integrative literature review.

Findings: The research based on extensive literature studies confirms that the relationship between managers' and employees' GCs and a firm's RI orientation is dynamic and reciprocal. This means that GCs acquired by organization members contribute to the development of a firm's RI orientation and also that a company's RI orientation has an impact on the increase of GCs among managers and employees in a firm. The conducted literature review enabled formulating five propositions regarding the relationship between GCs and RI.

Research limitations/implications: The author of the article is aware of the limitations of the conducted research. First, the concepts of GCs as well as RI are very broad, defined and explained in the literature in numerous different ways. This makes them difficult to describe and assess with certainty. Due to the number of publications necessary to study in regard to the concepts of green competences and responsible innovations, the conducted studies should be treated as an initial stage for further analyses. Moreover, as the study is restricted by the re-interpretation of existing research, further empirical research is needed to test the five propositions. Finally, due to a very dynamic development of the research field, a static, one-time analysis seems to be insufficient. Therefore, the replication of the study in the future is recommended to observe changing trends and shifts in the research field over time.

Originality/value: Based on the propositions regarding the relations between the GC and RI concepts, several models can be built to analyze the impact of organization members' GCs on a company's orientation towards RI as well as the impact of a firm's RI orientation on the level of GCs acquired by managers and employees. Future research pathways refer mainly to the operationalization of the RI dimensions as well as a firm's RI orientation.

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JEL: M10, M12, M13, O31

Koncepcje zielonych kompetencji i odpowiedzialnych innowacji – w poszukiwaniu wzajemności relacji

Streszczenie

Cel: eksploracja relacji między koncepcją zielonych kompetencji (GCs) a orientacją przedsiębiorstwa na odpowiedzialne innowacje (RI).

Metodologia: rozważania zawarte w artykule oparto na studiach literatury o charakterze integracyjnym.

Wyniki: na podstawie przeprowadzonych studiów literatury ustalono, że istnieje dynamiczny, wzajemny związek między zielonymi kompetencjami przyswojonymi przez członków organizacji a jej orientacją na odpowiedzialne innowacje oraz przedstawiono szereg propozycji kierunków badawczych w obszarze zarządzania innowacjami. Oznacza to, że GCs zdobywane przez członków organizacji przyczyniają się do rozwoju orientacji przedsiębiorstwa na RI, a także, że orientacja firmy na RI ma wpływ na wzrost GC wśród menedżerów i pracowników firmy. Przeprowadzony przegląd literatury pozwolił na zaproponowanie pięciu propozycji dotyczących badania relacji między GCs a RI.

Ograniczenia/implikacje badawcze: autorka artykułu zdaje sobie sprawę z ograniczeń prowadzonych badań. Po pierwsze, pojęcia GC i RI są bardzo szerokie, zdefiniowane i wyjaśnione w literaturze na wiele różnych sposobów. To sprawia, że trudno je opisać i ocenić w sposób jednoznaczny. Ze względu na ilość publikacji niezbędnych do studiowania w zakresie koncepcji zielonych kompetencji i odpowiedzialnych innowacji, przeprowadzone badania należy traktować jako wstępny etap dalszych analiz. Co więcej, ponieważ badanie jest ograniczone przez reinterpretację istniejących badań, potrzebne są dalsze badania empiryczne w celu przetestowania pięciu propozycji. Wreszcie, ze względu na bardzo dynamiczny rozwój pola badawczego, statyczna, jednorazowa analiza wydaje się niewystarczająca. W związku z powyższym, rekomenduje się powtórzenie badania w przyszłości, aby obserwować zmieniające się trendy i przesunięcia w polu badawczym w czasie.

Oryginalność/wartość: na podstawie propozycji dotyczących relacji między koncepcjami GCs i RI można zbudować kilka modeli do analizy wpływu GCs członków organizacji na orientację przedsiębiorstwa na RI, a także wpływu orientacji firmy na RI na poziom GCs zdobywanych przez menedżerów i pracowników. Przyszłe kierunki badań odnoszą się głównie do operacjonalizacji wymiarów RI oraz orientacji firmy na RI.

Słowa kluczowe: zarządzanie innowacjami, odpowiedzialna innowacja, zielone kompetencje.

1. Introduction

Being 'responsible and green' has become so important in contemporary business practice as the environmental issues are perceived as some of the most significant challenges of the world. Nowadays, firms are discovering that a reactive approach to environmental regulation purely focused on compliance is no longer a viable business strategy. As a result, they are taking a proactive approach to environmental management, characterized by forward-thinking management practices initiated voluntarily with a strategic goal that goes beyond compliance (Primc & Cater, 2015). One of strategic approaches promoting proactive management of environmental, social and

ethical issues is the responsible innovation (RI) concept. The conceptual development of RI has drawn on a range of disciplines, such as corporate social responsibility, technology assessment, and more broadly, science and technology studies (Long, Iñigo, & Blok, 2020; von Schomberg, 2013). The RI concept makes an explicit link between innovation and responsibility. Innovation is a future-creating activity, regarded as the engine of change for companies, economies and societies, generally seen as inherently good. However, nowadays it has become clear that the ability of innovation to provide benefits comes with the potential to harm (Lubberink, Blok, Ophem, & Omta, 2017). This may happen if an innovation is based on deception about benefits and side effects or if some environmental or societal anxiety being an implication of an innovation is not taken into consideration (Leone & Belingheri, 2017; Sudolska, Lis, Furmańska-Maruszak, & Górka, 2020). This highlights the need to better manage the innovation process in line with environmental and societal demands (Burget, Bardone, & Pedaste, 2017; Stilgoe, Owen, & Macnaghten, 2013). Taking such a perspective, business responsibility while innovating is about managers' critical reflection on the nuances of various environmental and socio-ethical issues in innovation management (Long et al., 2020).

Business entities focusing on integrating socio-ethical and environmental factors into their innovation process are characterized by having an RI orientation. Based on the literature studies, a firm's RI orientation can be described as a type of strategic orientation that is composed of a learning philosophy, strategic direction, and transfunctional beliefs which, in turn, guide all innovation-related activities, including those embedded in the formal and informal systems, behaviors, competencies, as well as the processes to promote responsible innovative thinking and facilitate successful development, evolution, and execution of RI (Ifeoma, Purity, & Okoye-Nebo, 2015; Long et al., 2020; Lubberink et al., 2017; Siguaw, Simpson, & Enz, 2006). In other words, RI orientation reflects the strategic philosophy of a company's management regarding its responsibilities to the environment and society. Such an orientation is also one of the attributes of a smart organization. As noted in the literature, smart organizations are knowledge-driven, dynamically adaptive to new technologies in a way that delivers the implementation of their strategy. They base their business philosophy both on sustainability and knowledge management as well as navigate their operations wisely, avoiding their adverse environmental impact (Adamik & Sikora-Fernandez, 2021; Putnik & Cunha, 2005). The possibility to implement any strategic approach in a firm is greatly influenced by the level of the competences of its workforce (Adhikari, Biswas, & Avittathur, 2016). The literature studies indicate that the proactive approach to environmental management, based on forward-thinking practices while managing innovation process, can be seriously enhanced by the managers and employees possessing the necessary green competences (GCs) (Cabral

& Dhar, 2019; Yong, Yusliza, & Fawehinmi, 2020). In the business context, GCs are the technical skills, knowledge, values and attitudes needed by the workforce, in all sectors and at all levels, in order to help the adaptation of the products, services and processes to the changes ensuing from climate change and to environmental requirements and regulations (“Greener Skills and Jobs”, 2014). Given the above definition, GCs are necessary for organizations focused on responsibility in general, also taken while innovating, as they help to develop and support sustainable economic, environmental and social outcomes in business.

Despite a vast body of research on GCs and RI in the business context, there is still a dearth of works discussing the intersections of both concepts. A literature review of the issue showed a significant research gap. Both the Web of Science and Scopus databases show a clear lack of research on the relations between managers’ and employees’ GCs and an organization focus on innovating in accordance with RI priorities is very limited. Therefore, to advance the literature in the field of innovation management, this study aims to investigate the relation between the GC concept and a company’s RI orientation. The research is based on an integrative literature review. This type of literature review has been chosen as it allows for studying the emerging topics that include both green competences and responsible innovations, searching for new relationships and perspectives in the analyzed field, as well as results in providing a research agenda that poses provocative questions or propositions giving direction for future research (Snyder, 2019; Torraco, 2005). By creating intersections between GC and RI research streams, this study enables a better understanding of the development of responsible innovating in the business context. The structure of the paper is as follows. First, the relevant literature explaining the GC and RI concepts and outlining their dimensions is provided. Then, based on the existing research review, the relation between GCs acquired by organization members and a firm’s RI orientation is examined to address five propositions that link the GC and RI concepts. The final section of the paper draws conclusions about the contributions, limitations and future research pathways.

2. The Concept of Green Competences

The concept of GCs is multifaceted and still developing. Generally, GCs are perceived as people’s abilities to interact with their immediate environment in a constructive manner (Steele, 1980). Pedersen (1999) indicates that GCs include resource conservation, practical skills, and outdoor skills as part of environmental skills, conscientiousness as part of an individual’s attitude, style, and awareness, and knowledge as well as a method of seeking and developing environmental knowledge. Furthermore, Corral-Verdugo (2002) defines GCs as effective reactions, green motives, perceptions, and attitudes, all of which are necessary for environmental

conservation. In a similar vein, Fraijo-Sing et al. (2013) highlight that GCs are made up of two main components: environmental knowledge and environmental skills, both of which must be used in line with the ecological requirements expected by society. Also Dlimbetova et al. (2015) argues that GCs refer to personal traits, skills, knowledge, abilities, and actions focused on lowering energy consumption, safeguarding ecosystems and biodiversity, or minimizing emissions and waste. The above said definitions highlight the environmental focus. However, while discussing the GC concept from the management perspective, it is significant to mention the definition provided by Subramanian et al. (2016), who defined GCs as the requisite ecological knowledge, skills and other socio-economic behavior that a person possesses to assist him/her in behaving and acting responsibly towards the general well-being of his/her immediate environment. The researchers distinguish two categories that are natural and acquired GCs (Subramanian et al., 2016). People's natural GCs are the fundamental qualities and personality dimensions of the individuals mainly derived from people's observations and mentorship obtained throughout their formative stages on the prevalent green behavior of their immediate social groups such as parents, relatives, and friends. As far as the management perspective is concerned, it is important to notice that employees' desire to engage in green behavior is largely dependent on their particular personal inclination and environmental ideals (Pichel, 2008; Ramus & Killmer, 2007). On the other hand, acquired GCs are the green knowledge and abilities that a person has gained via past experiences (Cabral & Dhar, 2021). This includes environmental education leading to individuals' strong attitudes for acting in an ecologically responsible manner. Taking the smart organization perspective, environmental awareness, knowledge and skills are now a priority for such entities. Their common response to the environment degradation is to make significant changes in the way they innovate in order to have a positive impact on the environment but also to generate robust social and financial capital. In this sense, green competences acquired by smart organization members make these entities the catalysts of the sustainable development goals fulfillment (Adamik & Sikora-Fernandez, 2021). Cabral and Dhar (2019, 2021) propose a conceptual framework pointing out six dimensions of GCs and providing a measurement instrument for GCs seen from the firm's management perspective. Based on a thorough literature analysis, those authors came up with the conclusion that GCs are hierarchical dispositional constructs composed of green awareness, green knowledge, green skills, green attitudes, green abilities, and green behavior.

The first dimension of GCs is green awareness. The literature sources examine green awareness in a variety of contexts, including awareness of the consequences of air pollution, customer awareness of the manufacturing process and the carbon footprint, awareness of energy consumption in the manufacturing process or awareness of environmental risk and the

cost-benefit analysis (He & Liu, 2018; Peng & Liu, 2016; Shrouf, Gong, & Ordieres-Meré, 2017). Despite numerous approaches to the issue, all green awareness explanations focus on a kind of person's sensitivity towards environmental problems. Kollmuss and Agyeman (2002) define green awareness as knowing of the impact of human behavior in the environment. Another definition explains green awareness as an individual's capacity to notice and be mindful of events, objects, ideas or sensory patterns concerning the natural environment challenges (Zareie & Navimipour, 2016). Taking the firm's perspective, employees' green awareness seems really significant as it enables people to be concerned about their adverse impact on the environment. In turn, they are more likely to take measures to mitigate such negative effects (Cabral & Dhar, 2019).

The next GC dimension is green knowledge, said to be crucial for acquiring GCs (Subramanian et al., 2016). Similarly as in case of green awareness, the literature provides several definitions of green knowledge. In general, green knowledge is knowledge about the facts, concepts as well as the relationships pertaining to the natural environment and the entire ecosystem. It is also explained as understanding of the natural environment, environmental degradation as well as eco-friendly actions (Dlimbetova, Zhylbaev, Syrymbetova, & Aliyeva, 2016; Fryxell & Lo, 2003). Kollmuss and Agyeman (2002) highlight that this dimension refers to the knowledge related to environmental issues as well as to the ability to propose solutions to solve such issues through the formation of green attitudes and green behavior. Summing up, green knowledge is significant for firms as it allows employees to recognize particular problems and then undertake behavior associated to preservation of natural environment.

The third GC dimension is called green skills. According to the GC concept, theoretical understanding of environmental challenges is insufficient to engage in environmental protection. Employees need to be equipped with green skills in this respect, which constitute the actual application of theoretical knowledge (Cabral & Dhar, 2021). Green skills are defined as professional and vocational skills, as well as generic skills (e.g. innovation and problem solving) required for new green jobs and the greening of existing jobs across all industries as a response to climate change and sustainability imperatives (Brown, 2013). They are called 'vivid skills' that are necessary to develop products/services/operations considering environmental challenges ("Green Skills and Environmental Awareness", 2012). As highlighted by several authors, green skills are necessary for the companies that aim at mitigating the usage of energy and raw materials, alleviating greenhouse gas emission, reducing pollution and conserving the ecosystem (Brown, 2015; Cabral & Dhar, 2021). Instilling green skills in employees guarantees that a company's activities are sustainable. They help to achieve green ability and above all act as a catalyst for improving an organization's financial and environmental performance (Cabral & Dhar, 2019, 2021).

A subsequent dimension of GC, pointed out in the literature, is green abilities. Cabral and Dhar (2021) notice that green abilities are an individual's capacities to integrate theoretical knowledge and practical expertise on the natural environment to solve real environmental challenges. As noted by some authors, green abilities assist employees in developing themselves and improving their performance in order to accomplish goals related to widely understood business responsibility (Gerhart, 2005; Rajiani, Musa, & Hardjono, 2016).

The fifth GC dimension is green attitude. Lee (2008) explains green attitude as individuals' cognitive assessment of the environmental protection value. Similarly, Zareie and Navimipour (2016) argue that green attitude is an attitude towards an environmental concern and a commitment to solving environmental problems. Various studies note that green attitude is a key variable driving employees to involve in pro-environmental behavior (Cabral & Dhar, 2019; Dlimbetova et al., 2016; Zareie & Navimipour, 2016).

The last dimension of the analyzed concept is green behavior. In the relevant literature, green behavior is also called eco-friendly behavior, environmentally sustainable behavior or responsible environmental behavior (Cabral & Dhar, 2019; Wang, 2016). Again, literature sources provide various definitions here. However, generally speaking, this dimension refers to employees' scalable behaviors that contribute to environmental sustainability. In other words, green behavior leads to an employee working in a sustainable manner, conserving resources, discouraging others from engaging in environmental degradation, taking action to protect the environment, and reversing environmental deterioration (Alvarez-García, Sureda-Negre, & Comas-Forgas, 2018; Ones & Dilchert, 2012). The literature sources classify green behavior into required (in-role, task-related) and voluntary (extra-role, proactive) green behavior (Islam, Khan, Ahmed, & Mahmood, 2020; Norton, Parker, Zacher, & Ashkanasy, 2015). When employees act within the scope of their jobs and obligations at work, they exhibit task-related green behavior. Such workers accomplish environmental performance that supports organizational strategies for environmental conservation. Voluntary green behavior refers to green behavior that workers engage in outside of the scope of their organizational responsibilities or activities. Such behavior supports organizational engagement in environmental-related activities, which may be backed up by environmental activism, motivating employees to participate in environmental initiatives (Cabral & Dhar, 2021).

3. The Concept of Responsible Innovation

The analysis of literature on the RI concept demonstrates that there are different approaches to define it. Some authors use the phrase 'responsible research and innovation' (van den Hoven et al., 2013; von Schomberg, 2011, 2013) while others 'responsible innovation' (Burget et al., 2017; Noorman,

Swierstra, & Zandbergen, 2017; Stilgoe et al., 2013). The main idea of the concept is to align the processes and outcomes of innovation with important societal and environmental values, needs and expectations through stakeholder and public engagement from an early stage (Macnaghten et al., 2014; Owen et al., 2013; Stilgoe et al., 2013). As highlighted by Hemphill (2014), it is a novel approach that extends the traditional definitions of innovation to consider the ethical, social, as well as environmental context within which the traditional innovation operates. The concept is also a point of interest for the European Union. EU documents explain it as an on-going process of aligning research and innovation to the values, needs and expectations of the society ("Rome Declaration", 2014). Nowadays, the RI approach is perceived as the means that allows firms to integrate environmental social and long-term economic concerns in their operations responding to sustainable development requirements.

Due to its main idea, the RI concept places numerous demands on the way the innovation process is organized. First and foremost, innovation should be managed by the principles of good governance, such as foresight, openness and transparency. Second, responsible innovation necessitates the involvement of a wide range of stakeholders in the innovation process. Furthermore, throughout the entire innovation process, societal as well as environmental challenges should be thoroughly studied, evaluated and controlled. What is of particular importance is that responsibility should be ingrained in both the process and the innovation outcomes. If innovation could lead to harmful societal or environmental implications, or if it violates ethical standards, mitigating actions should be undertaken (Gurzawska, Mäkinen, & Brey, 2017). Based on the relevant literature, innovation outcomes can be considered responsible if they are environmentally sustainable, ethically acceptable and socially desirable (Lubberink et al., 2017; von Schomberg, 2013). While considering environmental aspects, the RI concept prioritizes the sustainable use of natural resources during the innovation process, whereas ethical acceptability recommends that the consequences of innovation must be consistent with generally recognized norms and values in society (Covello & Iatridis, 2020).

The RI concept is described in the literature in four dimensions, indicating that innovating responsibly necessitates being anticipatory, reflexive, inclusively deliberate and responsive (Owen et al., 2013; Stilgoe et al., 2013; Swierstra, 2017). In this context, RI, perceived as the result of wise planning and execution, is motivated by concerns about the company's impact on the workplace, society, and the environment.

The first RI dimension, that is anticipation, entails describing and assessing the planned but also possibly unintended economic, social and environmental consequences of the to-be-developed innovation in the future (Stilgoe et al., 2013). In other words, the RI concept expresses the concern for the future as evidenced in business actions based on foresight and

reflection. The most crucial difficulty here is predicting how current research and innovation activities will affect the future. So in other words, anticipation requires that innovators understand the dynamics of the factors that shape the innovation. Consequently, anticipation needs asking questions: ‘What if...?’ (Burget et al., 2017; Long et al., 2020).

Searching for the answers to the above question relates to another dimension of RI, which is reflexivity (also known as reflexion). As noticed by Stilgoe et al. (2013), this dimension refers to analyzing the impact of innovation on the society and the environment. Reflexion requires an examination of possible implications of innovations, taking into consideration both what is known and what is unclear. It also refers to being conscious of the knowledge limitations and the fact that one’s reality may not be universally accepted (Lee & Petts, 2013; Stilgoe et al., 2013). As highlighted by several researchers, a company’s reflexivity alludes to having alternative innovation trajectories in case a modification is required, identifying diverse values of stakeholders, applying critical analysis of the values, needs and interests of multiple stakeholders, analyzing value conflicts among stakeholders as well as putting in place governance mechanisms to settle value conflicts, like multi-stakeholder advice committees (Kupper, Klaassen, Rijnen, Vermeulen, & Broerse, 2015; van de Poel et al., 2017). This involves the ability to self-critique an innovator’s assumptions and to reflect on how key issues regarding to-be-developed innovation are framed and thought about (Long et al., 2020).

The third RI dimension is inclusive deliberation (Owen et al., 2013; Stilgoe et al., 2013; Swierstra, 2017). The literature studies prove that all publications on RI emphasize the importance of inclusion and deliberation since they are connected to other responsible innovation dimensions (Blok, Hoffmans, & Wubben, 2015; Burget et al., 2017; R. Lee & Petts, 2013; Stilgoe et al., 2013; von Schomberg, 2013). Being inclusively deliberative entails stakeholders engagement in discussions aimed at examining the social, environmental and ethical consequences that the development of the innovation may bring (Burget et al., 2017; Owen et al., 2013; von Schomberg, 2013). This means that companies focusing on RI need to apply several methods of engaging stakeholders in order to conduct a dialogue with them to align their expectations and find a consensus of different goals and values (Blok et al., 2015; Bobola, Ozimek, & Szlachciuk, 2018; Kupper et al., 2015). According to the concept discussed, stakeholders and public members are involved upstream in the innovation process and encouraged to deliberate on the uncertainties related to the innovation (Lubberink et al., 2017; Stilgoe et al., 2013). This is viewed as a strategy for becoming mutually responsive to one another and anticipating innovation results in the context of serious social and environmental challenges for which they share responsibility (von Schomberg, 2013). Stakeholders’ and the public’s inclusion refers to the fact that RI aims at helping to successfully solve some

of grand challenges that, as noted by Czakon (2019), generate high demand for collective effort of various actors. Such a collective responsibility enables controlling and directing innovation into ethically acceptable, societally desirable and sustainable direction (Noorman et al., 2017).

The last dimension of RI is responsiveness. A firm's responsiveness refers to its ability to modify the shape or direction of innovation in response to the values of stakeholders or the environment. As noted by van de Poel et al. (2017), RI requires a capacity to change the existing routines of thought and behavior. At the bottom, a firm's responsiveness means being adaptive to the perspectives of the public and stakeholders (Lubberink et al., 2017). As noticed by Long et al. (2020), enterprise responsiveness aims to guarantee that the necessary resources and capabilities are available for the innovator to respond effectively to any issue raised through the articulation of the other dimensions. Based on the relevant literature, a company's responsiveness is said to be the key dimension enabling several options to be kept open and is a condition for adaptive change (Stirling, 2007). When a company is really responsive, the innovations it creates and offers to the society are the result of an ongoing dialogue with multiple stakeholder groups, demonstrating the characteristics of an organizational learning process geared toward dynamic adaptation to changing demands (Sudolska, Lis, & Chodorek, 2019).

4. Relations Between GCs and RI

Being green due to having green competences and applying green practices in a company, from a theoretical standpoint, is a catalyst for innovation. Complying with environmental standards necessitates the development and/or adoption of new technologies, using sustainable materials, considering waste and hazardous waste management, etc., in order to create favorable conditions for enterprises to spark innovation that is managed according to responsible innovation concept priorities (Wu, Liu, Chin, & Zhu, 2018). Following this logic, a relationship is supposed to exist between GCs and a firm's RI orientation. Based on extensive literature studies, it is assumed that the relationship between managers' and employees' GCs and a firm's RI orientation is dynamic and reciprocal (Aboelimged, Mohamed, & Hashem, 2019; Baeshen, Soomro, & Bhutto, 2021; Borland, Ambrosini, Lindgreen, & Vanhamme, 2016; Dzhengiz & Niesten, 2020). This means that GCs acquired by organization members contribute to the development of a firm's RI orientation and also that a company's RI orientation has an impact on the increase of GCs among managers and employees in a firm. The relevant literature offers several examples illustrating this relationship.

Several studies examine the relationship in which individual managers' or employees' GCs influence the development of a firm's RI orientation

(Baeshen et al., 2021; Borland et al., 2016). Companies focusing on sustainability aim at developing individuals' green awareness, knowledge, skills as well as attitudes and thus enhancing managers' and employees' green competences by providing training and instruction on environmental technologies and practices (Gluch, Gustafsson, & Thuvander, 2009; Pace, 2016). As indicated in several research studies, formal training of employees increases their enthusiasm and capacity to apply creative ideas that promote sustainable practices (Baeshen et al., 2021; Dzhengiz & Niesten, 2020; Pace, 2016). The individuals revealing a high level of environmental awareness, who introduce green values (resulting in green skills, abilities, attitudes and behaviors), consistently think in a manner that goes 'beyond the job' and 'beyond the product' (Dzhengiz & Niesten, 2020). This directly affects the way of organizing the innovation process in a firm (Buchholz & Rosenthal, 2005; Gluch et al., 2009; Long et al., 2020; Verkerk, De Leede, & Nijhof, 2001). As pointed out by Long et al. (2020), moral and environmental awareness and sensitivity of a manager influences his/her ability to recognize the moral or environmental aspect of the decisions related to innovation. An individual's moral and environmental sensitivity represents the person's ability to notice and consider potential ethical and environmental implications of a particular decision (Buchholz & Rosenthal, 2005; Long et al., 2020). Moreover, various authors argue that responsible management of the innovation process is not just applicable to decision-makers. Instead, it is heavily influenced by individual-level factors. They argue that the principles of the RI concept are important for all employees working within the innovation process. Every employee within an innovation team or with connections to innovation activities is likely to be able to affect (intentionally or unintentionally) both the process and product – even if only to a little degree. In other words, all organization members, no matter their level, bear responsibility related to to-be-developed innovation (Long et al., 2020; Verkerk et al., 2001). The above insights from the literature justify a proposition that argues a positive relationship between GCs and a firm's RI orientation.

Proposition 1

Organization members' GCs lead to managing the innovation process according to the priorities of the RI concept.

As noted by several authors, the availability of human resources with GCs in-house and managers' adherence to environmentally friendly methods of operating are regarded as the major motivators for corporations to implement the RI concept (Aboelmaged, Mohamed, & Hashem, 2019; Baeshen et al., 2021; C. Wu, Ding, & Chen, 2012).

Managers' green knowledge and their awareness regarding environmental challenges imply various activities undertaken by enterprises in regard to anticipating innovation outcomes, like using scenario planning and horizon

scanning, conducting foresight studies, applying real-time technology assessment methods, risk assessment methods, value sensitive design method or incorporating sustainable factors into investment decisions (Giannoni, Alarcón, & Vera, 2018; Kupper et al., 2015). As highlighted in the literature, such individuals, often called 'green advocates', are critical to initiating and facilitating organizational responses to environmental pressures, especially when they occupy a position of some influence and responsibility (Chen & Chang, 2013; Verhulst & Van Doorselaer, 2015). In line with the aforesaid studies, a proposition referring to the relation between GCs and a firm's anticipation abilities was proposed.

Proposition 2

Companies with a high level of GCs enjoy an increase in their abilities to anticipate during the innovation process.

Also Lozano (2006) examines the relation between individual GCs and organizational change. The aforesaid author claims that the lack of managers' and employees' GCs may bring in the resistance to organizational change in general. Here, it is important to note that the implementation of RI dimensions in a company requires serious organizational change as it means the conversion of the entire innovation process including, among others, foresight studies, applying real-time technology assessment methods and risk assessment methods, using sustainable materials, developing policies for managing hazardous waste, protecting natural resources, pre-launch consultations for new products, creating stakeholder engagement strategies as well as conducting a stakeholder dialogue. In a similar vein, Borland et al. (2016) as well as Hesselbarth and Schaltegger (2014) argue that managers at different levels, presenting a high level of GCs and having a long-term managerial mindset toward ecological sustainability may act as change agents to promote considering environmental issues while innovating. Furthermore, managers with strong environmental values and attitudes are more likely to see environmental concerns as opportunities, initiate pro-environmental choices, and promote related actions. In turn, it leads to the increase of green knowledge and confidence among organizational members, which consecutively influences the quality and quantity of a firm's environmental performance. This means that managers with a high level of green awareness, knowledge, skills and abilities will view the concept of RI as an opportunity and will approach all difficulties and barriers related to the implementation of the activities in the area of anticipation, reflexivity, deliberation and responsiveness (Papagiannakis, Voudouris, & Spyros, 2014).

As highlighted by Dzheng and Niesten (2020), who have conducted extensive literature studies on the relation between widely understood environmental competences at the individual level and organization environmental capabilities, any firm's strategic transdisciplinary responses begin with raising managers' and employees' awareness and knowledge

(for example, about carbon footprint, energy consumption and waste). Sharing knowledge and promoting 'green' practices eventually result in the implementation of company strategies focused on solving environmental challenges. Nowadays, one of such strategic directions is implementing the RI concept. However, as emphasized by Laasch and Conaway (2015), one of the strongest inhibitors while introducing responsible management practices is a lack of middle and senior management skills. Thus, developing GCs among organization members seems to be a prerequisite for introducing the RI concept in business. The following proposition links organization members' GCs and a firm's RI orientation.

Proposition 3

Companies with a high level of GCs are more responsive during the innovation process.

Nowadays, another significant issue regarding a firm's focus on environmental conservation refers to fact that stakeholders and various institutions exert pressures on business entities to improve their environmental performance (Dzhengiz & Niesten, 2020; Papagiannakis et al., 2014; "The European Green Deal", 2019). In many studies, it has been proved that managers' and employees' GCs have a positive impact on a firm's environmental performance (Chen & Chang, 2013; Perez-Valls, Cespedes-Lorente, & Moreno-Garcia, 2016; Subramanian et al., 2016). As noted by Lahneman (2015), companies with the most demanding and detailed implementation of environmental standards at the same time have very a high level of GCs, measured by shared knowledge of environmental sustainability. In a similar vein, Vickers and Lyon (2014) allege that the institutional 'green' stimulus requires the development of GCs in the companies. The above-mentioned relation demonstrates how the need to be reflexive and responsive to stakeholders as well as wider public requirements influences the need to develop organization members' green knowledge, skills, abilities as well as behaviors. The aforementioned studies prove that organization members' GCs impact a company's environmental outcomes while it constantly invests to develop GCs.

Considering the reciprocal relation between managers' and employees' GCs and a firm's RI orientation, it is of great importance to note that organization members enhance their GCs also on the job. When a company integrates environmental sustainability into its strategy and thus innovation process, employees also learn experientially and through dialogue with stakeholders that are involved in different corporate functions (Dzhengiz & Niesten, 2020). This shows a the relationship reciprocity – the companies focused on sustainability and creating innovations in a responsible way can foster responsible, 'green-aware' managers and employees, while these drive the strategic change that is implementing the concept of RI.

Conducting the activities in the field of anticipation needed for RI, such as foresight, technology assessment or scenario development as well

as developing waste management practices, etc., implies the need for enhancing managers' and employees' not only green knowledge but also green skills and abilities. Furthermore, a company's reflexivity, which means having alternative innovation trajectories in case any changes are required, forces business entities to focus on enhancing managers' and employees' green knowledge, skills and abilities. Similarly, enterprise responsiveness that includes the ability to modify the shape of innovation in response to stakeholder or environment needs and values requires adequate green awareness, knowledge as well as green abilities (Allen, Cunliffe, & Easterby-Smith, 2019; Lee, Lin, Lin, & Lu, 2014). Based on the above reasoning, the following two propositions were formulated.

Proposition 4

Companies presenting high reflexivity enjoy an increase of GCs.

Proposition 5

Companies presenting high responsiveness enjoy an increase of GCs.

5. Conclusions

The GC and RI concepts implantation in business is of great strategic importance while developing smart and sustainable organizations. To take responsibility for the environment, firms need to follow RI priorities, which means their focus on anticipation of innovation outcomes, reflexion on passable changes in the innovation direction if needed, stakeholder inclusion as well as provision of the capabilities required to respond to the stakeholder perspective in regard to innovation. GCs can trigger RI through providing knowledge, skills, abilities and behaviors needed to implement the above priorities in business.

The paper contributes to the development of the body of knowledge in management sciences through exploring the GC and RI concepts and possibilities to integrate them in order to enhance a firm's capability to create ethically acceptable and socially desirable innovations. In particular, the study builds up the added value for the research practice through formulating five propositions that link the GC concept to business focus on managing innovation process in accordance with RI principles. However, it is important to mention the existing constraints of the study. First, the concepts of GCs as well as RI are very broad, defined and explained in the literature in numerous different ways. This makes them difficult to describe and assess with certainty. Additionally, due to the number of publications necessary to study in regard to the concepts of green competences and responsible innovations and, on the other hand, the limited paper volume, the conducted studies should be treated as an initial stage for further analyses. Moreover, as the study is restricted by the re-interpretation of

existing research, further empirical research is needed to test the five propositions. Based on the propositions regarding the relations between the GC and RI concepts, several models can be built to analyze the impact of organization members' GCs on a company's orientation towards RI as well as the impact of a firm's RI orientation on the level of GCs acquired by managers and employees. Future research pathways refer mainly to the operationalization of the RI dimensions as well as a firm's RI orientation. Finally, due to a very dynamic development of the research field, a static, one-time analysis seems to be insufficient. Therefore, the replication of the study in the future is recommended to observe changing trends and shifts in the research field over time.

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