

Preface

There are different approaches to the practice, research and education for responsible and sustainable development (Arevalo & Mitchell, 2017). Typically, sustainable topics also have a specific property; sustainable objectives are rarely consistent (Albert et al., 2017). For managers, students and academics to become more aware of these contradictions, especially in the age of digitalization and in the Fourth Industrial Revolution requires new ways of education. With a focus on responsible and sustainable management practices, they need to be able to use innovative technologies and understand the impact of these technologies, as well as becoming more globally aware of their decisions to ensure responsible and sustainable management. Management should therefore truly understand the impact of their business processes on the environment and use responsible, sustainable and globally aware management to survive and thrive in the Fourth Industrial Revolution with their various stakeholders.

Even more so, in times of a growing and interconnected, global business environment and novel, sometimes potentially disruptive technologies, frequently described in the concept of the Fourth Industrial Revolution. The Fourth Industrial Revolution or 4IR, is proposed as the fourth major industrial era since the initial Industrial Revolution of the 18th century (Kagermann, 2015; plattform-i40.de, 2019). Industry 4.0 has become a buzzword for the current and future trends of automation and data exchange in manufacturing technologies especially put forward from government, scholars and practitioners from Germany (plattform-i40.de, 2019). It includes cyber-physical systems, the Internet of things, cloud computing and cognitive computing. More recently, digitalization and technologies such as artificial intelligence, big data and analytics, autonomous vehicles and drones, 5G, 3D printing and even blockchain technologies are also subsumed under this umbrella term. Therefore, firms in the digital age operate in an environment that is characterized by the emergence of potentially disruptive, digital technologies (Yoo et al., 2012) and blurring industry boundaries (Porter & Heppelmann, 2014). Startups with novel business models such as from the so called sharing economy (Herrmann-Fankhänel, 2019) or platforms such Facebook and high-tech firms such as Google

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threaten existing industry structures (Teece, 2010; Yoo, Henfridsson & Lyytinen, 2010) and established companies face their traditional business models challenged and at risk (Bharadwaj et al., 2013). While traditional corporate innovation practice mainly focused on products and services, the digitalization forces the traditional industry to initiate and actively shape the next wave of innovation to address the challenges and opportunities of the Fourth Industrial Revolution (Kagermann, 2015).

So far, we have not experienced an industrial revolution before where technology and humans are so closely integrated, and this has a profound effect on how these changes will impact on managers and why it is critical for managers to be more responsible, more focused on sustainability and why it is critical to be globally aware. This publication aims to address complex and unknown issues around management, focusing on responsible, sustainable and globally aware practices and principles. It starts by exploring the individual and the changes needed in individual thinking and other cognitive processes. The assumption is that managers will not be able to manage organizations if they have not become more creative, using their imagination to view the future more and to manage businesses more effectively and efficiently.

This book is addressing these challenges by outlining various fields in this context are addressed, new technologies are critical reflected, and overviews are provided that help also academics familiar in the field to better navigate through the related theoretical concepts, recent technologies and their implications for application and society on different levels.

This comprehensive and timely publication aims to be an essential reference source, building on the available literature and joint expertise in the field of management, while providing for further research opportunities in this dynamic field. It is hoped that this text will provide the resources necessary for governments, nonprofit and for-profit organizations, and managers specifically to address sustainability needs in businesses and countries around the world.

The primary intended audience is scholar-practitioners and researchers who have the need for reference material regarding the subject matter of the proposed publication as outlined above. The secondary intended audience is undergraduate and postgraduate business students who require the same reference material. At the same time, while having academic rigor, the book is written in a way such that it can be understood by non-academics and non-specialists; it will be appealing to the general public.

This book was initiated on the basis of a multi-level, permanent and academic cooperation in responsible, sustainable and globally aware management education and practice. This cooperation was predominantly built on a bi-continental approach called “Joint Expertise”. The “Joint Expertise” project supported by the German Academic Exchange Service, tried to establish such a responsible, sustainable and globally aware management education approach for master and doctoral students

between the University of Technology Chemnitz, Faculty of Economics and Business Administration and the University of Kwazulu-Natal (UKZN), School of Management, IT and Governance (Herrmann-Fankhänel, et al. 2017). As we were looking for further knowledge generation and development we called out for more contributions on this topic all over the world to gather a maximum of expertise. As a result, we received many contributions that dealt closely with these and related issues from a variety of perspectives. After a rigorous editorial and blind review process the most interesting and advanced chapters were subsequently accepted for this publication. A good number of very valuable contributions were also received that, for a number of reasons, did not reach the acceptability threshold set for this book. For those who are interested in the numbers for this book, we received 29 proposal submissions, 4 were rejected and 24 accepted for submission of a full chapter. Finally, 17 full chapters were submitted and 12 finally accepted for publication. Here in the preface, we want to outline and reflect on the resulting contributions of our endeavor to collect and advance the body of knowledge on the responsible, sustainable and globally aware management education and practice in the Fourth Industrial Revolution:

Section 1 deals with “Impact and Challenges of the Fourth Industrial Revolution on Responsible, Sustainable, and Globally Aware Management” and the big picture of the presumed changes of Industry 4.0, and in general, digital technologies for sustainability in the context of responsible and globally aware management is outlined. In particular, Marlen Gabriele Arnold and Anne Fischer from the Chemnitz University of Technology in Germany address this section focus comprehensively in their chapter “Digitization and Sustainability: Threats, Opportunities, and Trade-Offs”. They investigate the connection between digitization and sustainability by applying a SWOT analysis, review the literature on digitization and sustainability and develop a concept map for visualizing key topics in light of digitization and sustainability. In addition, for illustrating unconscious knowledge two exemplifying systemic structural constellations are presented. Their results suggest immense tensions between sustainability and digitization, but also offer progressive patterns. In light of a development towards sustainability, they critically evaluate digitization and except no panacea for sustainability but propose the need for societal progress and strict law regulation based on digital transformation that requires a precise and honest value basis and sustainability added value. In the chapter “Sustainable Implications of Industry 4.0”, Jorge Tarifa-Fernandez from the University of Almeria in Spain takes a slightly different approach and more optimistic view towards Industry 4.0, and in general, digital technologies. For him both concepts represent a fundamental model shift towards decentralization and individualized production so that traditional supply chains have to evolve into highly adaptative networks. Therefore, one can expect a series of also positive sustainable implications at economic, environmental

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and social level. Both chapters reflect to some degree also the ongoing discussion between techno optimistic (see e.g. Brynjolfsson and McAfee, 2014) and pessimistic stances (Gordon, 2015; Cowen, 2011; Bloom et al., 2017; Nordhaus, 2015).

Section 2, “Imagination and New Concepts to Solve Global Business, Innovation, and Sustainability Challenges,” provides a more theoretical lens towards global responsible innovation and its possible sustainability and business implications. Frequently, innovation and creative solutions towards sustainability need vision and foresight. Imagination is an often-overlooked integral element of human progress in general and innovations in particular, claims Julien Bucher from the Chemnitz University of Technology in Germany in his contribution “The Overlooked Roots of Innovations: Exploring the Relevance of Imagination on Innovation Using Science Fiction”. In this chapter, he argues, that the examination of the diffusion and evolution of imaginations and their manifestation as innovations can help to understand the imaginative roots of innovations and to create a responsibly chosen path into a sustainable future. Moreover, Science Fiction as a specific area of manifested imagination might be also used to manifest imaginations’ influence in the social imagination in general and certain individuals such as scientists and innovators in particular. Beyond this, its purposeful use as a marketing tool to sell or discredit ideas in the wake of the digitalization is also addressed. These ideas might be of specific interest of scholars of innovation and practitioners who are interested in the so called “fuzzy front end” of radical innovation processes and discuss that in the context of responsible and globally aware management (Stüer et al., 2010; Hüsigg & Kohn, 2003; Hüsigg, 2014). The responsible and globally aware management of innovation requires also a clear understanding and communication of innovation terms and concepts related to innovation for and from emerging markets – which is the point that Martin Albert and Stefan Hüsigg again from the Chemnitz University of Technology in Germany want to make. The objective of their conceptual chapter “Towards a Classification Framework for Concepts of Innovation for and From Emerging Markets” is to develop a theoretical classification framework based on a comprehensive literature overview that provides a starting point for structuring these different terms and concepts. As a result, they are able to identify 33 terms concerning innovation for and from emerging markets, various spellings and synonyms. Finally, a theoretical-based classification framework is derived and the criteria ‘market orientation’, ‘determinants’, ‘nature’, ‘sophistication’, ‘sustainability’, ‘novelty’, and ‘innovator type’ is proposed. This classification framework could be used for further research and teaching in innovation, responsible and sustainable management disciplines.

In Section 3, “Global Responsible and Sustainable Management Competencies to Drive Responsible and Sustainable Business Practices”, a more practical and managerial approach is at the center of the chapters. Consequently, Sangeeta Trott, from ITM-SIA Business School from India takes a closer look at “Marketing to Develop Environmental Sustainability, Awareness, and Action”. The main purpose of this chapter is to understand the role of marketing in creating awareness and action for sustainability in the fourth industrial revolution. In her chapter she explains how marketing can play an important role in developing awareness and action at various phases of sustainability with suitable examples. However, “Sustainable Project Management” seems to be relevant not only for marketing purposes when it comes to the facilitation of Industry 4.0 technologies. Martin Albert and Friedrich Mickel from the Chemnitz University of Technology in Germany elaborate on recent developments in the discipline of project management that has begun to focus on sustainability, but literature shows that the topic of sustainable project management is still incipiently explored. Therefore, their chapter aims to identify connections between sustainability and project management. They performed a literature review of 46 different texts and analyzed them using a bibliometric analysis and a qualitative content analysis. In order to develop the profession of sustainable project management, focusing upon the verification of theoretical findings with empirical research is suggested.

Section 4 focuses on “Global Responsible Governance and Regulation of Digitalization and Potentially Disruptive Technologies”. Here Henry Frank Wissink from the University of KwaZulu-Natal from South Africa has contributed a chapter called “Governance and Public Policy Challenges in Managing Disruptive and Innovative Technologies” that is an effort to promote and guide thinking about the global and local challenges in how governments respond to innovative and disruptive projects and technologies. His chapter is based on the considerations of, and concerns regarding the challenges and changes that humanity faces on a global scale and how it impacts on the notion and need for innovation. Since not all inventions or innovations are disruptive or serve the interest of the public at large, and some even may have serious harmful consequences or impacts it is or should be the role of governments to be responsible and proactive to ensure that the best interests of both the business and public sector are pursued for the purposes of long-term sustainability. This chapter clearly provides a novel facet to the ongoing discussion of the regulation and management aspects of disruptive innovation that should be of utmost relevance to practitioners and academics alike (Hüsig et al., 2014). In this regard, few technologies have been framed more disruptive than blockchain technology. This is what Dagmar Gesmann-Nuissl from the Chemnitz University of Technology in Germany is interested in from a legal perspective in her chapter “Blockchain Technology in International Trade in Goods”. In her contribution she

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highlights various fields of application and the related legal challenges in international trade. Especially in the transportation of goods, a large number of documentation obligations must be adhered to and permits must be obtained. These documents could be displayed on the blockchain in the future and showcase the opportunities of the digitalization for potentially increased efficacy.

Finally, in Section 5, “Applications and Reflections of Innovative Technologies and Global Responsible and Sustainable Management”, the focus is on concrete applications of 4IR technologies and approaches to increase sustainability of specific operations in various industries such as transportation, textile, waste management and pharmaceutical with a particular interest in the African context. However, technology is not the sole answer that offers huge potentials regarding the transformation towards sustainability. Katja Schneider and Marlen Gabriele Arnold, both from the Chemnitz University of Technology in Germany, show that these improvements might also require a facilitation of business model innovations embedding shifting consumer demands. Therefore, they take a closer look on how can the textile industry drive responsible and sustainable business practices in terms of social sustainability in their chapter called “Responsible and Sustainable Business Model Innovation in the Textile Industry: Exploring Approaches to Social Sustainability”. Tackling this question, they conducted a qualitative content-based analysis of current literature which highlights main themes and concepts on business model innovations, textile industry and social sustainability. In addition, results of their exploratory multiple case studies show social sustainability patterns are seldom and often linked to external pressures. This chapter proposes a reorientation towards stronger holistic and inclusive approaches for sustainability and reflects on socio-cultural aspects linked to sustainable textile business models. Progressing sustainability in the textile industry needs both, a single consideration of environmental and social issues as well as an integrative and systemic perspective in academia as well as in practice. Indira Padayachee and John Mukomana from University of KwaZulu-Natal in South Africa focus on the digitalization in the transportation sector with their contribution “Factors Influencing Port Terminal Automation in the Fourth Industrial Revolution: A Case Study of Durban”. Their chapter reports on a case study aimed at determining the challenges and limitations experienced with the current information and communication technology used in port terminals in Durban and examines how technological, organizational and environmental factors influence port automation. Their quantitative approach revealed that adequate technology needs to be acquired and the compatibility and complexity of the technology have the biggest influence on the automation of terminal ports in Durban. However, also communication with stakeholders and IT skills retention were found to be important organizational factors and customer readiness emerged as an important environmental factor influencing the automation of port terminals in Durban. In

another contribution from the African continent Bibi Zaheenah Chummun, also from University of KwaZulu-Natal in South Africa looks at the “Environmental Performance in the Waste Management Industry of Africa: A Measure of Responsible Management”. This chapter emphasizes on the landscape of the sector of waste management and the challenges facing the waste industry in Africa. In the midst of the Fourth Industrial Revolution, the proliferation of the technology revolution is changing the mindset of people relating to waste management. The mobility of people to the different places of African continent, a hike in industrial advancements and the increase in the rise of goods consumption among others are fueling the generation of waste across Africa that leads to environmental degradation, pollution and non-compliances by the activities of waste management companies prevail and impinge on environmental performance. Therefore, propositions to address those issues and ensure responsible management of emerging African markets in the era of the Fourth Industrial Revolution are provided. Finally, Aveshin Reddy and Micheline Juliana Naude, both from University of KwaZulu-Natal in South Africa take a look at “Factors Inhibiting Green Supply Chain Management Initiatives in a South African Pharmaceutical Supply Chain” in their chapter. There they focus on the role of green supply chain management in achieving a sustainable competitive advantage, exploring the factors that affect green supply chain management initiatives at a leading pharmaceutical manufacturer in Durban. In their study a descriptive and exploratory case study approach is used and their findings reveal that the main factors affecting green supply chain management initiatives include high costs, lack of government support, and pressure to reduce selling prices. Since a limited number of studies have been conducted on this topic, their findings and recommendations contribute to the knowledge on the Fourth Industrial Revolution and increased environmental awareness which is forcing business leaders to adapt to the changing environment in functional areas such as the supply chain.

As a conclusion, the editors are very satisfied with the result. We were able to gather a multidisciplinary cross-section of approaches from various subfields and countries to the practice, research and education for responsible and sustainable development in the age of digitalization and in the Fourth Industrial Revolution. As outlined above, many chapters contributed novel ideas, concept and approaches to the theme of the book and will enrich the ongoing discussion on the implications of the digitalization and the Fourth Industrial Revolution for responsible and sustainable development on a global scale. By doing so, we will help future managers, students and academics to become more globally aware of these issues and equip them with inspirations how a responsible, sustainable and global aware management education and practice in the Fourth Industrial Revolution—a “Management 4.0”—should be designed.

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