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Responsible innovation in Asia: A systematic review and an agenda for future research

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Abstract

Based on a comprehensive and structured literature analysis of 48 studies, this study explores and highlights the key research developments in the domain of responsible innovation in Asia. Accordingly, the paper critically analyses, maps, and structures responsible innovation research in Asia, and synthesizes the findings into an integrative conceptual framework that provides the basis for future scholars to further build on and practitioners to be guided by. Moreover, the study identifies several shortcomings in extant literature, proposes several avenues for further research, and provides best practice recommendations for researchers. This study revealed that majority studies were conducted in context of China, India and Korea. Contextually, there is a scope to extend research in other emerging Asian markets which are under-researched such as Pakistan. The key theories applied in the domain of responsible innovation in Asia were the resource-based view and stakeholders' theory and major themes for the outcomes were discussed from *social, environmental, and economic* perspectives. Theoretically, there is a scope to apply and empirically validate other theories such as legitimacy and reputation-building perspectives and resource-dependency. Given the issue of responsible innovation is managerially important, studies should also examine underlying motivations for the responsible innovation, applying behavioral theory of firm.

Keywords Responsible innovation · Asia · Systematic review · Conceptual framework · Future research agenda

Responsibility has always been a significant element for both innovation research and practice (Stilgoe et al., 2013). However, the human capacity for creativity and innovation exceeds the appropriate level of innovation needed to provide positive and sustainable outcomes to society. Hence, concerns about intended and unintended

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effects of new technologies explain growing calls for responsible innovation (Pandza & Ellwood, 2013). Referred to as "taking care of the future through collective stewardship of science and innovation in the present" (Stilgoe et al., 2013: p. 1570), the origins of the concept come from science and technology literature and the concept was only recently introduced in the management field (Ambos & Tatarinov, 2021). Moreover, even though the concept is both old and new, responsible innovation is framed differently based on time and place, as different contexts could create tensions and contradictions, thus these require a further examination of the actions of various stakeholders in new contexts (Pandza & Ellwood, 2013).

In simple terms, responsible innovation is defined on the basis of three norms i.e., doing good, avoiding harm, and protecting people and planet (Voegtlin & Scherer, 2017). A majority of the scholars in management field have defined responsible innovation outcomes from *social, environmental, and economic perspectives.* The responsible innovation is important to examine in context of Asian region.

This is mainly because the region of Asia Pacific is the most populated region in the world, with 4.2 billion people, India and China being the two countries with the highest population percentage (Budhwar et al., 2019). Added to this, during the last two decades, emerging and developed economies in Asia have grown considerably and contributed substantially to global economic growth (Budhwar et al., 2016, 2019). This fast-paced economic development, combined with the various new technologies emerging constantly, as well as the large population of the region, means that Asia represents a significant portion of the global focus and development of responsible innovation. This increasing contribution of Asian economies in innovation and global development, followed by a growing research interest in responsible innovation in the emerging countries during the last decade, and the subsequent increase in the number of studies, require a review (Acs et al., 2017; Ahlstrom, 2010). There is a great need to conduct context-specific research to better understand responsible innovation issues in Asia and the contextual factors underlying the concept in the region.

Moreover, despite the recent attention given to cross-national differences in studies on responsible innovation (e.g., Ambos & Tatarinov, 2021; Setiawan, 2020), there is no systematic review that places specific attention on the implementation of responsible innovation in Asia, and how various micro- and/or macro-environmental factors in the Asian context may influence the concept of responsible innovation. In fact, most research finds as a setting context the Western countries in comparison to the Asian ones or neglects a large part of the non-western geographical regions (Ko et al., 2020), focusing in only one, two or three most researched Asian countries, such as China, India, and Korea. Furthermore, the most addressed topics consider socially responsible business, ethics, CSR and innovation capacity, leaving no room for a deep comprehensive analysis of the phenomenon (Zhou et al., 2020; Graafland and Zhang, 2014; Jun, 2016). There is clearly a research gap between Western and Asian economies in respect to responsible innovation, a gap that results from theoretical confusion in a different cultural context, high fragmentation (de Hoop et al., 2016) and lack of empirical research to cover a broader geographical area rather than few specific countries (Ko et al., 2020). Thus, a systematic review is necessary to provide the idiosyncrasies and unique characteristics of responsible innovation related to the Asian context, as it fits

the aim of our study in making sense of fragmented research and study the topic in depth in order to identify flaws of research, and possible gaps in extant knowledge, addressing future research in a direction that is useful to the entire academic communities and practitioners in the domain of interest (Denyer & Tranfield, 2009).

The purpose of this study is two-fold: first, to assess the current status of responsible innovation research in Asia; second, to provide a critical analysis of how different responsible innovation constructs from other geographical regions have been operationalized in the context of the Asian region, and the theoretical lenses that have been applied. In this sense, our review is the first initiative to systematically examine the existing literature (48 relevant studies published in peer-reviewed publication outlets) on responsible innovation in Asia. We explore the patterns of (1) year, journal, and type of publication; (2) authors' information and other data; (3) content by antecedents, dimensions of the responsible innovation phenomenon, and outcomes; (4) applied theories; (5) methodologies, measures, and research design applied; (6) study findings.

The present study makes three substantial contributions to the domain. First, we contribute to the literature by providing a systematic identification and critical analysis of the antecedents and outcomes of responsible innovation, as well as its various dimensions, when applied in the Asian region. This logic led to the development of a conceptual framework, which synthesizes previous findings and provides the basis for future scholars to further expand the boundaries of the domain in relation to the Asian context. Second, we provide an identification of how various responsible innovation constructs have been conceptualized and measured, as well as a specification of the network of variables to which these constructs are related in the Asian context. Third, another significant contribution is provided by reviewing the theoretical perspectives used in extant research on the responsible innovation concept in Asia, to identify and explain the relevance of these theories to examining responsible innovation issues in Asia, and how this theoretical basis could be further enhanced to consider the various socioeconomic and institutional factors that characterize the implementation of responsible innovation in Asia. Finally, we contribute to the domain of responsible innovation by highlighting opportunities for further research in terms of theory, methodology, and context, which are likely to differ because of societal, institutional, and economic influences in Asia, thus further advancing the development of the field.

In the next section we describe the methodology applied for conducting the review. Following this, we provide a brief description of the characteristics of the studies included in the final sample, and we continue by analyzing, discussing, and synthesizing our findings in a conceptual framework. Finally, we provide a set of guidelines for future research and best practice approaches in terms of theory, methodology, and context.

Methodology

This research draws on the systematic literature review methodology with the aim to map, structure, and synthesize existing research in a robust procedure (Christofi et al., 2019; Gaur & Kumar, 2018; Palmatier et al., 2018; Pisani et al., 2017). This process is an effective method to collect evidence on the researched topic by applying a scientifically accepted and reproducible procedure (Christofi et al., 2017; Denyer & Tranfield, 2009). The systematic review follows a step-by-step standardized procedure that requires the definition of a search strategy (Christofi et al., 2021b, c; Tranfield et al., 2003). In particular, we select the database from which we will identify the articles published in journals related to the disciplines that are relevant to our research topic (Bhimani et al., 2019; Dike & Rose, 2017; Schmeisser, 2013). The procedure further continues with the definition of the search formula, a set of keywords used in the database, which will search for titles, abstracts, and subject terms of articles, mostly bringing up the desired search results (Christofi et al., 2017; Leonidou et al., 2018; Schneider & Spieth, 2013). The publications in the dataset obtained will be screened and selected based on predetermined exclusion and inclusion criteria related to our research purpose (Pisani, 2009; Pisani et al., 2017; Gaur & Kumar, 2018; Christofi et al., 2021a; Christofi et al., 2019; Tan & Taeihagh, 2020; Thorpe et al., 2005).

Conceptual boundaries

An important component of the systematic literature review process is to establish conceptual criteria in order to identify the context of analysis (Denyer & Tranfield, 2009).

Based on the definition of responsible innovation proposed by Genus and Iskandarova (2018), this study frames RI as a concept developed around the control of risk and uncertain futures, open science, which supports innovation and ethical research, as well as struggles to realize inclusive deliberation. Moreover, the definition highlights the role of language and other institutionalizing factors in spreading and embedding the RI research and policy agenda (Genus & Iskandarova, 2018).

Moving from this definition, several elements should be considered, as: control for the future, inclusive practices, ethics, and supportive policies, highlighting that responsible innovation is an umbrella term for a broad category of practices, strategies, an/or ideas (Koops, 2015). This suggests that there is a lack of a unique accepted definition (Foley et al., 2016), due to the high fragmentation and the different stages of evolution of responsible innovation within different countries (de Hoop et al., 2016).

For these reasons, we referred to the four dimensions identified by Stilgoe et al. (2013), with the consideration that "a prospective model of responsibility works through four dimensions, couples anticipation, reflection and deliberation to agency and action and makes explicit the need to connect with cultures and practices of governance" (Owen et al., 2013, p.1576).Added to this, there is the need to highlight

the importance of RI in developed and emerging countries (Ko et al., 2020). If the responsible research and innovation (RRI) approach has been emphasized by developed countries, where the intention is to intervene in the early phases of technological progress to develop higher positive levels of innovations, countries with emerging technologies could play a key role in the unpredictable effects of their innovations. Therefore, we decided to consider the context for this systematic to be that of the Asia region.

In order for the selected articles to be representative of the Asian region, we followed the UN classification of 47 developed and developing economies in Asia (Kutaula et al., 2020). We also included Russia, based on Bai, Du, and Solarino (2018). We highlighted the impact of responsible innovation in the competitive advantage, firm value, and economic growth of Asian companies in the global market, as a response to the increasing demands from customers and governments, as well as an important instrument to take on climate responsibility. All the abovementioned categories were merged into our search formula (Genus & Iskandarova, 2018; Pandza & Ellwood, 2013; Stilgoe et al., 2013).

In this systematic literature review we concentrate on a connection between these concepts or definitions regarding the organizational aspects that foster responsible innovation, its drivers, and possible effects on various levels of analysis. Starting from the previously explained conceptualizations and to reply to our research question, we focused on responsible innovation and the organizational context of Asia, regarding culture, regulations, political climate, technological advancement knowledge, and labor aspects of the Asia region. We also included papers relating to the international contexts (with at least one country coming from the Asian region), including comparative cross-country studies and studies that analyze the phenomenon of responsible innovation from macro and micro perspectives. Thus, our research includes articles that discuss the comparative aspect of responsible innovation between developed and developing economies, organizational practices, and their impact on the adoption of responsible innovation strategies, and the evolving process of the innovation itself, with the aim to gain a comprehensive understanding of the diverse implementations of responsible innovation strategies that work better in the Asian context.

Search strategy

To gain a more comprehensive understanding of responsible innovation strategies in Asian countries, this study uses quality criteria to let a sample emerge from the application of the inclusion and exclusion criteria.

The EBSCO host's Business Source Premier database was selected as our main search source, as it covers several disciplines of business, also used in other top-literature reviews (Vrontis & Christofi, 2019), due to the presence of peer-reviewed business journals (Kranzbühler et al., 2018).

We start our systematic review by running a keyword search formula on titles, abstracts, and subject terms (Pereira et al., 2021; Christofi et al., 2017). We conducted an initial scoping study in order to collect keywords used in existing

studies that relate to responsible innovation (Genus & Iskandarova, 2018; Owen et al., 2013; Pandza & Ellwood, 2013) in developed, developing, and emerging countries (World Economic Situation and Prospects, 2020), specifically relating to Asia (Yerrabati & Hawkes, 2015). The keyword search formula was made up from two sets of words. The first set relates to responsible innovation – TI ('responsible innovation' OR 'responsible research and innovation') OR TI (innovation AND responsibility)) OR AB (('responsible innovation' OR 'responsible research and innovation') OR (innovation AND responsibility)) OR SU (('responsible innovation' OR 'responsible research and innovation') OR (innovation AND responsibility)—and the second relates to Asia or an Asian country, in its broadest sense as explained above—(Asia OR Japan OR Brunei OR Cambodia OR China OR Korea OR Fiji OR 'Hong Kong' OR Indonesia OR Kiribati OR Lao OR Malaysia OR Mongolia OR Myanmar OR 'Papua New Guinea' OR the Philippines OR the 'Democratic People's Republic of Korea' OR Samoa OR Singapore OR the 'Solomon Islands' OR Taiwan OR Thailand OR 'Timor-Leste' OR Vanuatu OR Vietnam OR Afghanistan OR Bangladesh OR Bhutan OR India OR Iran OR the Maldives OR Nepal OR Pakistan OR 'Sri Lanka' OR Bahrain OR Iraq OR Israel OR Jordan OR Kuwait OR Lebanon OR Oman OR Qatar OR 'Saudi Arabia' OR Palestine OR 'Syrian Arab Republic' OR Turkey OR 'United Arab Emirates' OR Yemen OR Russia).

For our main purpose, we considered the application of some exclusion and inclusion criteria, often used in leading systematic reviews published in top journals (Christofi et al., 2019; Tan & Taeihagh, 2020; Vrontis & Christofi, 2019). This led us to exclude non-academic peer-reviewed articles such as summaries, book reviews, book chapters, editorials, as well as duplications.

Thus, we included only peer-reviewed academic papers, written in English, which were published in peer-reviewed journals ranked in the Association of Business Schools' Academic Journal Guide 2018 (www.charteredabs.org). Following other systematic reviews on this theme (Thapa et al., 2019), we also included studies published in the *Journal of Responsible Innovation.* As Guston et al., (2014, p. 5) explain, the relevance of the *Journal of Responsible Innovation* refers to the fact that «*it is dedicated to publishing articles that demonstrate excellent scholarship and can also frame discussions and elicit debate among experts in the field; inform the efforts of scientists, engineers, designers, and other innovators to participate in RI, and of policy-makers to make better decisions about technological innovations and innovation policy* […]». The inclusion of studies published in academic journals is a standard practice in existing systematic reviews in order to satisfy the quality criterion of the final sample and to be based on validated knowledge that has been evaluated in terms of academic quality and rigor, theory robustness, implications for practice, methodology, data and supporting argument, and contribution to knowledge (Phillips et al., 2015).

Carefully considering the review protocol, we initially identified 536 academic peer-reviewed articles from the EBSCO database. After excluding the studies that did not fit our inclusion and exclusion criteria, we started reading the titles and abstracts of the remaining 165 papers. When the relevance

criterion was difficult to assess, because the abstract and title reading fail to provide important insights to be considered for the overall analysis, we included them in the next step for full-text reading (Christofi et al., 2021a; Thorpe et al., 2005). This practice is not new, but it is also present in other systematic reviews dealing with topics that are very fragmented or lack a common accepted unique definition of the phenomenon of interest and are surrounded with theoretical confusion (Christofi et al., 2021b, c; Savastano et al., 2019).

Then, we considered only studies related to responsible innovation in the Asian region. This process returned 59 studies. Out of these articles, 11 were then

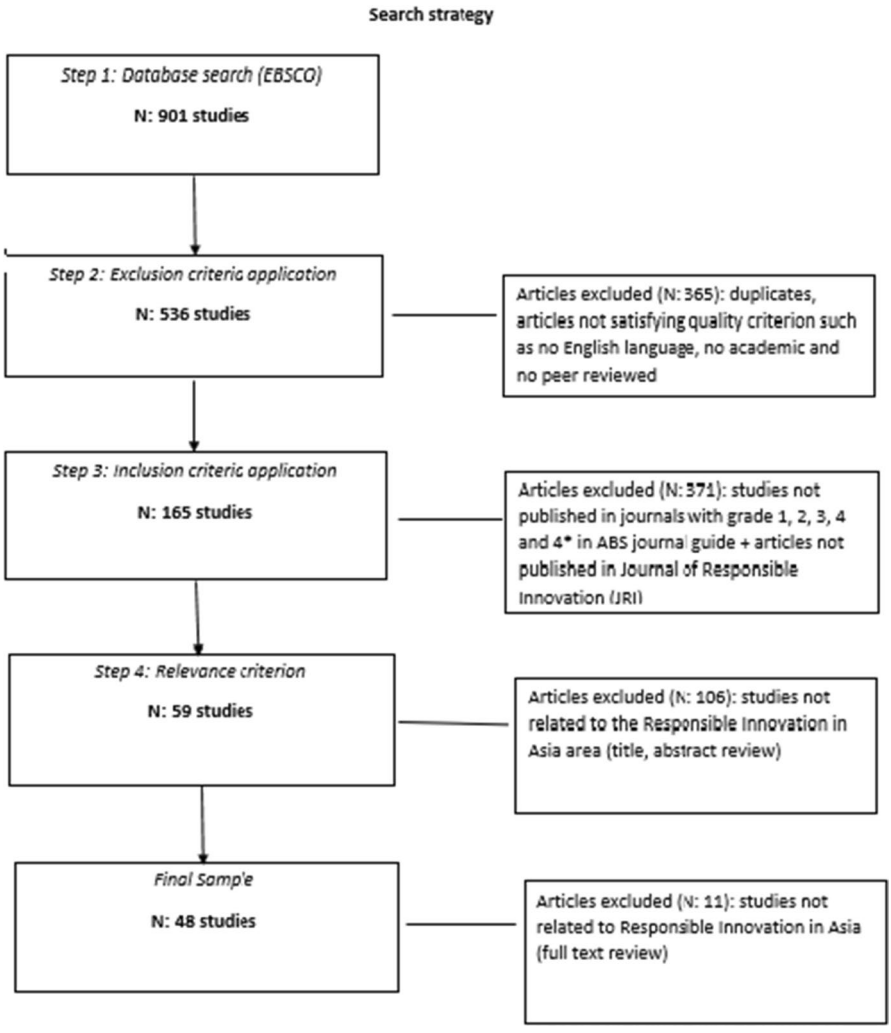

Fig. 1 Search strategy

excluded because were found not relevant to our purpose after full text reading, thus leaving 48 relevant articles in our sample. This 5-step process, which led us to a sample of 48 studies, is reported in Fig. 1; additionally, the data have been reported to an extraction table.

Coding procedure

Based on the type and the intended contributions of our systematic review, multistep qualitative coding was applied (Christofi et al., 2021b, c). To do so, we followed the examples from state-of-the-art systematic reviews (e.g.: Battisti et al., 2021; Christofi et al., 2022; Christofi et al., 2022; Vrontis et al., 2021), with some variation according to the objectives of the systematic review (Vrontis et al., 2022). Thus, we first documented the basic facts of each article. Then, the results have been coded based on a framework (e.g., antecedents—including an institutional level of analysis—moderators, outcomes of responsible innovation in Asia). Finally, we also coded possible future research directions suggested by scholars in extant literature (Vrontis et al., 2020). All the information retrieved and coded was included in a data extraction table.

Brief characteristics of existing studies

Publication details

Carefully analyzing the articles in our sample, we find that a total of 48 papers have been published on responsible innovation (RI) in Asia during a time period of sixteen years (2005–2021). Even though no cut-off point was considered as an eligibility criterion for the selection of studies in our sample, the oldest publication accounts to the year 2005. According to our understanding, this can be explained with the growing attention on responsible innovation in the Asian context, partly influenced from the socially desirable form of development emerging in Western countries, as well as the need to make adjustments to existing innovation policies (Eizagirre, Rodríguez and Ibarra, 2017).

As we can see from Table 1, the number of papers published has experienced a continuous growth year by year, starting from 2015. This can be attributed to the increased interest of researchers on the impact of responsible innovation strategies on Asian organizations (MNCs, SMEs, etc.): 62.5% of the papers have been published in a time period of six years (2016–2021), finally coming to a head in the number of articles published in the year 2020, with a total of N = 10 articles published. The understanding of responsible innovation is broader, as it considers all kinds of public, private, and civil society actors and types of collaborations among these as possible innovators, not just particular types of organizations (Scherer & Voegtlin, 2020). Table 1 shows the distribution of publications featuring the responsible innovation topic over the years. It is obvious that there is an increased interest in publications regarding the topic, considering the high number of publications in 2020 (N = 10) and in the first part of 2021 (N = 2, until May 7th).

Table 1 Literature Distribution by Journal and Publication Year

	2005	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Corporate Social Responsibility and Environmental Management						1						2	5		5	1	**14**
Journal of Business Ethics			2		1	1		1	1								**6**
Journal of Business Research										1	1		1		1		**4**
Asia Pacific Business Review										1	1						**2**
Business Ethics: A European Review								2									**2**
Industrial Management and Data Systems											1				1		**2**
Journal of Responsible Innovation											1				1		**2**
Academy of Management Perspectives															1		**1**
Benchmarking: An International Journal													1				**1**
Career Development International														1			**1**
Corporate Governance		1															**1**
Emerging Markets Review																1	**1**
Energy Policy							1										**1**
International Journal of Productivity and Performance Management										1							**1**
International Journal of Bank Marketing										1							**1**
International Journal of Consumer Studies				1													**1**
International Journal of Nonprofit & Voluntary Sector Marketing														1			**1**
International Journal of Production Economics															1		**1**
Journal of Applied Accounting Research											1						**1**
Journal of Business & Industrial Marketing														1			**1**
Journal of Industrial Ecology													1				**1**
Management Decision										1							**1**
World Development	1																**1**
Total	**1**	**1**	**2**	**1**	**1**	**2**	**1**	**3**	**1**	**5**	**5**	**2**	**8**	**3**	**10**	**2**	**48**

Table 2 Frequencies of Publication by Journal

Journal	No. of articles	ABS Ranking	%
Corporate Social Responsibility and Environmental Management	14	2	29%
Journal of Business Ethics	6	3	13%
Journal of Business Research	4	3	8%
Asia Pacific Business Review	2	2	4%
Business Ethics: A European Review	2	2	4%
Industrial Management and Data Systems	2	1	4%
Journal of Responsible Innovation	2	Not ranked	4%
Academy of Management Perspectives	1	3	2%
Benchmarking: An International Journal	1	1	2%
Career Development International	1	1	2%
Corporate Governance	1	1	2%
Emerging Markets Review	1	1	2%
Energy Policy	1	2	2%
International Journal of Productivity and Performance Management	1	1	2%
International Journal of Bank Marketing	1	1	2%
International Journal of Consumer Studies	1	1	2%
International Journal of Nonprofit & Voluntary Sector Marketing	1	1	2%
International Journal of Production Economics	1	3	2%
Journal of Applied Accounting Research	1	2	2%
Journal of Business & Industrial Marketing	1	2	2%
Journal of Industrial Ecology	1	2	2%
Management Decision	1	1	2%
World Development	1	3	2%
Total	**48**		**100%**

The findings confirm that despite it being quite a new field of study, responsible innovation (RI) has promising potential and has been successful in diffusion (de Hoop et al., 2016). In consideration to journals included in the sample (see Table 2), the *Corporate Social Responsibility and Environmental Management* is the main guest journal for articles on responsible innovation in Asia or an Asian country, with a total of 14 articles (29%). It is followed by the *Journal of Business Ethics* with six articles (13%) and the *Journal of Business Research* with four articles (8%). *Asia Pacific Business Review, Business Ethics: A European Review*, *Industrial Management and Data Systems* and the *Journal of Responsible Innovation* host two articles each on the topic (4%), while the remaining journals host one article publication each (see Table 2 for more details). As is obvious from the above table, the first three journals (*Corporate Social Responsibility and Environmental Management,* the *Journal of Business Ethics* and the *Journal of Business Research*) account for 50% of the research publications. This highlights their relevant attention since 2008

(the first article published by the *Journal of Business Ethics*, cf. Table 2), and their consistent contribution to the evolution of the responsible innovation concept.

Specifically, *Corporate Social Responsibility and Environmental Management* is the host for a large number of articles published within our research topic and is focused on the factors affecting CSR and sustainability-oriented innovation and their effects, innovation performance, as well as cross-country differences: five articles explore the factors and/or effects driving CSR and/or sustainability oriented innovations (Hsu & Cheng, 2012; Tang et al., 2021; Wu, 2017; Wu et al., 2020; Xiang et al., 2020), two articles focus on firms' innovation performance (Anser et al., 2018; Zhu et al., 2019), three articles focus on the environmental perspective of CSR and/or innovation (Jiménez-Parra et al., 2018; Pan et al., 2021; Shafique et al., 2021), one article explores R&D spending (Gao et al., 2017), one article explores the adoption of new standards (Balzarova & Castka, 2018) and one article is a cross-country comparison of corporate innovation (Ullah & Sun, 2021).

Papers published in the *Journal of Business Ethics* include three articles on the impact of innovation on national competitiveness (Boulouta & Pitelis, 2014; Gugler & Shi, 2009; Jamali et al., 2009), one article on green management influences on product innovation (Shu et al., 2014), one article on business adaptation and innovation for foreign direct investment (Bardy et al., 2012), and one article on supply chain innovation (Isaksson et al., 2010). The *Journal of Business Research* offers a more extensive identification of responsible innovation, with a focus on firms' process of learning to innovate (Mirvis et al., 2016), improving innovation capability (Lai et al., 2015) and exploring the CSR-innovation relationship (Broadstock et al., 2020; Upadhaya et al., 2018).

Moreover, we considered the classification of studies in different thematic areas. For this, we draw on the Chartered Association of Business School (CABS) fields' classification to better understand the holistic development of the topic. As shown in Table 3, existing research in journals covers a wide range of fields and different disciplines such as regional studies, planning and environment area studies (31%), ethics, CSR, and management area studies (29%), marketing (8%), international business and area studies (6%) and operations and technology (6%). The first two areas cover more than the half of publications (60%), so we can deduce that there is a growing interest in regional development and environmental aspects of the topic about the ethical, sustainable, and managerial areas.

Authorship characteristics and important publications

We identified a total of 127 authors coming from different universities and institutions in 22 different countries (see Table 4). Considering the origin of the main author, we can see a clear domination of the Chinese origin (19%, n = 16 authors) in our sample. Further, we have contributions from Korea and USA (n = 3 authors each), Australia, India, Pakistan, Spain, Switzerland, the Netherlands and the UK (n = 2 authors each). All the remaining countries number one contribution each.

In regard to the number of authors involved in research (see Table 5) we find that in 63% of studies there is a collaboration of three or more authors, and in 31% of cases the co-authors work in three or more institutions. In our sample, regardless of the diversity of countries when compared to the number of studies, 56% of them are attributable to a researcher based in a single country (see Table 5). It is unexpected that considering the global quality of the responsible innovation concept and the fact that industries are revolutionizing in a process of globalization and marketization (Anser et al., 2018), research carried out by a global research team still remains diminutive.

An analysis of the number of citations was conducted to assess the most impactful articles on the topic (see Table 6). This type of analysis, based on the number of citations, is an effective tool to measure the quality of the manuscript, and the times a study is cited are a representation of its contribution in the body of knowledge (Crossan & Apaydin, 2010). The five most impactful studies (as per number of citations) in our sample are as follows: Jamali et al. (2009; citations, 496), Gugler and Shi (2009; citations, 405), Ringov and Zollo (2007; citations, 371), Boulouta and Pitelis (2014; citations, 302), Isaksson et al., (2010; citations, 162).

Specifically, the first article is an examination of the relational attributes of SMEs contributing to continuing improvement and innovation, and how this inclination can be further nurtured and leveraged (Jamali et al., 2009). The concept of improved efficiency and technology and management innovation based on CSR is the main issue in the second paper, which explores the conceptual and practical gap existing between developed and developing countries in relation to innovation adoption strategies (Gugler & Shi, 2009).

Table 3 Journal Field of Research

Field of Journal	Journal rank					TOTAL	%
	4*/4	3	2	1	Not ranked		
Regional Studies, Planning and Environment			1	14		15	31%
Ethics, CSR and Management		11	2	1		14	29%
Marketing			1	3		4	8%
International Business and Area Studies			2	1		3	6%
Operations and Technology		1		2		3	6%
Information Management				2		2	4%
Accounting			1			1	2%
Finance				1		1	2%
Human Resource Management				1		1	2%
Sector Studies			1			1	2%
Social Science		1				1	2%
Not ranked					*2*	*2*	4%
TOTAL	**0**	**13**	**8**	**25**	**2**	**48**	**100%**

*Based on CABS fields classification

The main topic addressed is that innovation demands pose great challenges to the developing-country MNEs' aspiration of entering the global market, while cultural, legal, institutional, technological, and economic differences can contribute to different attitudes and approaches in implementing standards between the North and the South (Gugler & Shi, 2009). Across this array, a common theme arises: companies do not have an established play-book for innovating in this space and they (and their partners) must learn together to produce successful innovations (Mirvis et al., 2016).

The responsible innovation construct: reviewing the empirical research on Asian regions

Responsible innovation is defined as "*taking care of the future through the collective stewardship of science and innovation*" (Stilgoe, Owen, et al., 2020). As this construct represents the theoretical framework most usually adopted in the field (Verburg et al., 2020), in our systematic review we have looked for the concept of RI, understanding the innovation process in organizations, where people are

Table 4 First author institutional location

First Author's Geographical location	No. of articles
China	16
Korea	3
USA	3
Australia	2
India	2
Pakistan	2
Spain	2
Switzerland	2
The Netherlands	2
UK	2
Czech Republic	1
France	1
Germany	1
Hong Kong	1
Israel	1
Japan	1
Lebanon	1
Malaysia	1
New Zealand	1
Singapore	1
Sweden	1
Vietnam	1
Total	**48**

Table 5 Authorship characteristics

Numbers of Authors	No. of articles	%
One	7	15%
Two	11	23%
Three or more	30	63%
	48	**100%**
Number of Countries (*first author*)		
One	27	56%
Two	17	35%
Three or more	4	8%
	48	**100%**
Number of Institutions		
One	17	35%
Two	16	33%
Three or more	15	31%
	48	**100%**

the proactive actors in developing new products, services, and business models, and in taking care about the environment. We specifically identified the organizational and institutional level antecedents and respective consequences in context of Asian markets.

Empirics and data characteristics

Research design

Regarding our sample, the majority of articles included in this systematic review are of an empirical type, with a total of 39 out of 48 studies included. The remaining part of the studies consist of a conceptual design and are mainly reviews of existing literature within the field of responsible innovation in Asia.

Out of the 39 studies, 29 of them use a quantitative design, mostly relying on a single source of data and implying a questionnaire; only eight studies are of a qualitative design, where three studies use case studies to collect data (Jamali et al., 2009; Mirvis et al., 2016; Park, 2009), three studies use interviews (Blahová et al., 2015; Jun, 2016; Shu et al., 2014), one study uses observations (Dong & Xu, 2016) and one study uses ethnographic fieldwork (de Hoop et al., 2016). Further, only two studies from our sample use mixed methods; one of them combines personal interviews and surveys to collect data (Graafland & Zhang, 2014), while the other one combines surveys and observations (Balzarova & Castka, 2018).

When considering the sample composition of the research included in this review, we can say that most studies have focused on companies operating in Asia and/or an Asian country (including SMEs, MNCs, etc.). For instance, in their

Table 6 Prominent citations

Studies	Citations	
(Jamali, Zanhour & Keshishian, 2009)	496	Jamali, D., Zanhour, M., & Keshishian, T. (2009). Peculiar Strengths and Relational Attributes of SMEs in the Context of CSR. Journal Of Business Ethics, 87(3), 355–377. https://doi.org/10.1007/s10551-008-9925-7
(Gugler & Shi, 2009)	405	Gugler, P., & Shi, J. (2009). Corporate Social Responsibility for Developing Country Multinational Corporations: Lost War in Pertaining Global Competitiveness?. Journal Of Business Ethics, 87(S1), 3–24. https://doi.org/10.1007/s10551-008-9801-5
(Ringov & Zollo, 2007)	371	Ringov, D., & Zollo, M. (2007). Corporate responsibility from a socio-institutional perspective The impact of national culture on corporate social performance. CORPORATE GOVERNANCE, 7(4), 476–485. https://doi.org/10.1108/14720700710820551
(Boulouta & Pitelis, 2014)	302	Boulouta, I., & Pitelis, C. (2014). Who Needs CSR? The Impact of Corporate Social Responsibility on National Competitiveness. Journal Of Business Ethics, 119(3), 349–364. https://doi.org/10.1007/s10551-013-1633-2
(Isaksson et al., 2010)	162	Isaksson, R., Johansson, P., & Fischer, K. (2010). Detecting Supply Chain Innovation Potential for Sustainable Development. Journal Of Business Ethics, 97(3), 425–442. https://doi.org/10.1007/s10551-010-0516-z

study, Shu et al., (2014) focus on a stratified sample of firms operating in 23 Chinese provinces. The same concept also followed the study of Lai et al. (2015), when they collected survey data on a sample of 500 respondents from firms operating in the central Taichung area in Taiwan. Only a limited number of studies draw on a sample of stakeholders and include experts, investors, and customers, and only one study includes a sample of diverse participants from government, industry, and academia (Ko et al., 2020).

Conceptualization of measures

In Table 7 we present a categorization and conceptualization of all the measures used in the sample of articles researched to capture responsible innovation and related issues in the Asian context. As is obvious from the listed measures, they focus on aspects such as organizational culture and structure, corporate social responsibility, stakeholder perceptions, legislative pressure, environmental and social performance, innovation capability, and intention to adopt and R&D spending, as important components of the entire innovation process in the bigger frame of responsibility. Further, these measures were conceptualized as measures related to one of the four dimensions of responsible innovation by Owen et al. (2013), respectively: anticipation, reflexivity, inclusion, and responsiveness.

Measures used in responsible innovation (RI) studies in Asia

Table 8 comprehensively summarizes the measures that researchers used in their works that are part of our sample for responsible innovation studies in Asia. From the empirical studies included in our sample, we identified the measures, if they were adopted or developed by the researchers for the aim of their study, if they were single-item or multi-item, and the location of the studies. As some of the studies in our sample consist to cross-country analysis (respectively 6 studies), where at least one of the datasets was collected from an Asian country, we position these studies at the bottom of the table for each dimension (anticipation measures, reflexivity measures, inclusion measures and responsiveness measures)., As we can evidence from Table 8, researchers have mostly used measures developed in the Western context to explore responsible innovation issues in Asia. The majority of the scales used are multi-item scales, with only two studies adopting single-item scales, respectively the study by Yao et al. (2019), which adopted a single item to measure environmental agency pressure following the previous work of Berrone et al. (2013), and the study by Gao et al., (2017), which used a single-item scale to measure R and D spending in Chinese companies, based on existing measures in literature (Bouquet & Deutsch, 2008; Greve, 2003; McWilliams & Siegel, 2000; O'Brien & David, 2014). As is obvious from Table 8, a large number of studies in our sample focus on existing measures of CSR (Graafland & Zhang, 2014; Hsu & Cheng, 2012; Jamali et al., 2009; Jun, 2016; Shafique et al., 2021; Zhou et al., 2020), including measures

Table 7 Measures' conceptualization

CONCEPTUALIZATION OF MEASURES			
ANTICIPATION MEASURES	REFLEXIVITY MEASURES	INCLUSION MEASURES	RESPONSIVENESS MEASURES
Measures of organizational culture	Measures of social sustainability at work	Measures of CSR disclosure	Measures of CSR activity
Measures of ESG performance	Measures of personal values and personal norms	Measures of CSR commitment	Green product innovation measures
Measures of national competitiveness	Measures of awareness of consequences	Measures of relationship commitment	Green organizational culture measures
Measures of social performance	Measures of ascription of responsibility	Measures of stakeholder perception of policies	
Measures of ESG performance	Measures of intention to adopt green IS	Measures of environmental disclosure	
Measures of environmental agency pressure and public pressure			
Strategic management and performance measures			
Measures of innovation performance (R&D spending and R&D intensity)			
Measures of environmental regulation			
Measures of eco-innovation			
Measures of organizational ambidexterity			

of CSR activity (Yang et al., 2019; Zhu et al., 2019), measures of CSR commitment (Tang et al., 2021), measures of CSR disclosure (Dong & Xu, 2016) and environmental CSR (Pan et al., 2021). Other researchers use existing scales to measure innovation performance (Wu et al., 2020) and eco-innovation (Pan et al., 2021). While most of the studies use validated existing measures, or just adapt measures to their research, only three studies consider the self-development of measures that better fit the context of Asia. Specifically, Factor et al. (2013), in a cross-country analysis encompassing 11 countries, from which also Asian countries, developed an index entitled 'Social Responsibility at Work' to measure social sustainability at work. The index is constructed from two main items: the belief of respondents in the importance of the view that a job allows someone to help other people and the importance that a job has to society. Moreover, in another study, Lee (2016) developed a three-item scale to measure the supplier's social performance, a three-item scale to measure environmental performance, which included environmental performance improvements in product safety, waste, and emissions; a four-item scale was also developed to measure relationship commitment, based on extant literature, including trust, family-like atmosphere, mutual respect, and long-term partnerships. Further, Jiménez-Parra et al. (2018), in their cross-country study, developed a measure based on a country's environmental behavior—that country's willingness to solve environmental problems and its efforts to promote this environmental behavior by its own citizens and firms in order to measure environmental regulation.

Adaption of existing measures to the Asian context

From the sample of articles included in this systematic review, we can imply that researchers in Asia are mostly establishing the validity of measures that have been developed in the West for developed economies. Obviously, most studies have adopted the existing and evaluated measures that were enhanced through a careful review of extant literature. Further, some of the studies adopt existing measures, but contribute with the adaption of the measures when required to fit them to their national context. Most cross-country studies such as the studies by Ortas et al. (2019); Boulouta and Pitelis (2014); Tasaki et al. (2019); Ullah and Sun (2021); and Xiang et al. (2020), make usage of existing measures developed for the Western context. In some cases, the researchers try to make adaptations to better fit their context of study.

In their study, Ortas et al., (2019) consider an aggregation of the CEP, CSP, and CGP in a unique measure for a multilevel (country level, firm level) research in sustainability. In another study, Zhou et al. (2020) argue that CSR is a construct that has been measured in many different ways. We used four items to measure CSR, adapted from previous research, including Carroll (1979): senior leaders' attitude, the corporate governance system, the mitigation of negative impacts, and senior leaders' support for and participation in CSR activities. Different emerging economies have a range of criteria to measure the intensity of corporate social responsibility. Arguably, due to different geographical conditions, emerging economies have different priorities, which should be tackled immediately (Zamir & Saeed, 2020). This is why

Table 8 Measures used in the sample for responsible innovation studies in Asia

CLASSIFICATION OF MEASURES	STUDY CITED	SINGLE/MULTI ITEM	RELEVANCE	LOCATION OF STUDIES
ANTICIPATION MEASURES				
Measures of organizational culture	(Upadhaya et al., 2018)	Multi-item	An adapted version of Organizational Cultural Profile (OCP) Instrument that covers 7 cultural dimensions	Nepal
Measure of organizational ambidexterity	(Shafique et al., 2021)	Multi-item	12-item scale adapted from Lubatkin et al. (2006)	Pakistan
Measures of social performance	(Lee, 2016)	Multi-item	Self developed a three-item scale to measure the supplier's social performance. It reflected improvements in the realms of health, safety and human rights of employees and local communities	South Korea, Vietnam
Measures of environmental performance	(Lee, 2016)	Multi-item	Self developed a three-item scale The scale included environmental performance improvements in product safety, waste and emissions	South Korea, Vietnam
Measures of environmental agency pressure and public pressure	(Yao et al., 2019)	Single item	Existing measures, previously used in a study by Berrone et al. (2013)	China
Strategic management and performance measures	(Blahová et al., 2015)	Multi-item	Existing measures	Japan
Measures of innovation performance	(Wu et al., 2020)	Multi-item	Existing measures	China
Measures of eco-innovation	(Pan et al., 2021)	Multi-item	Existing measures. Adopts the OECD classification of environmental technologies to measure eco-innovation	China

Table 8 (continued)

CLASSIFICATION OF MEASURES	STUDY CITED	SINGLE/MULTI ITEM	RELEVANCE	LOCATION OF STUDIES
Measures of environmental CSR	(Pan et al., 2021)	Multi-item	Existing measures (adopted Hexun's scoring of the environmental dimension of firms' CSR)	China
Measures of R&D spending	(Gao et al., 2017)	Single-item	Based on existing measures in literature (Bouquet and Deutsch (2008), Greve (2003), McWilliams and Siegel (2000), O'Brien and David (2014))	China
Measures of ESG performance	(Ortas et al., 2019)	Multi-item	An aggregation of the CEP, CSP and CGP in a unique measure for a multilevel (country level, firm level) research in sustainability)	Cross-country
Measures of national competitiveness	(Boulouta & Pitelis, 2014)	Multi-item	The National Corporate Social Performance to measure the performance of firms across three dimensions: economic, social and environmental	Cross-country
Measures of environmental regulation	(Jiménez-Parra et al., 2018)	Multi-item	Self-developed a measure based on a country's environmental behaviour, that country's willingness to solve environmental problems, and its efforts to promote this environmental behaviour with its own citizens and firms	Cross-country

Table 8 (continued)

CLASSIFICATION OF MEASURES	STUDY CITED	SINGLE/MULTI ITEM	RELEVANCE	LOCATION OF STUDIES
REFLEXIVITY MEASURES				
Measures of personal values and personal norms, of awareness of consequences, ascription of responsibility, and measures of intention to adopt green IS	(Dalvi-Esfahani et al., 2017)	Multi-item	Utilised the new Portrait Values Questionnaire (PVQ-RR) developed by Schwartz et al. (2012), adapted measures of personal norms from the studies by Steg (2005) and Stern et al. (1999), adapted from the previous works (De Groot and Steg, 2009; Klöckner and Blöbaum, 2010; Steg, 2005) and adopted measures previously used by Gholami et al. (2013) and Chen et al. (2011)	Malaysia
Measures of social sustainability at work	(Factor et al., 2013)	Multi-item	Develop an index titled 'Social Responsibility at Work' (SRW). It is constructed from two main items: 1- the respondents belief of how important it is that a job allows someone to help other people, 2- the respondents belief of how important it is that a job is useful to society	Cross-country
INCLUSION MEASURES				
Measures of CSR disclosure	(Dong & Xu, 2016)	Multi-item	Existing measures	China
Measures of CSR commitment	(Tang et al., 2021)	Multi-item	Adapted from existing measures following (Zamir & Saeed, 2020)	Pakistan

Table 8 (continued)

CLASSIFICATION OF MEASURES	STUDY CITED	SINGLE/MULTI ITEM	RELEVANCE	LOCATION OF STUDIES
Measures of CSR	(Graafland & Zhang, 2014; Hsu & Cheng, 2012; Jamali et al., 2009; Jun, 2016; Shafique et al., 2021; Zhou et al., 2020)	Multi-item	Existing measures	Lebanon, Korea, China, Taiwan, Pakistan
Measures of relationship commitment	(Lee, 2016)	Multi-item	Developed four items for relationship commitment, based on the discussions and measures in Krause, Handfield, and Tyler (2007), Carey, Lawson, and Krause (2011), and Lynch et al. (2010), including trust, family-like atmosphere, mutual respect and long-term partnership	South Korea, Vietnam
Measures of stakeholder perception	(Tasaki et al., 2019)	Multi-item	Existing measures (adapted)	Cross-country
Measures of environmental disclosure	(Ullah & Sun, 2021; Xiang et al., 2020)	Multi-item	Existing measures	Cross-country
RESPONSIVENESS MEASURES				
Measures of CSR activity	(R. Yang et al., 2019; Zhu et al., 2019)	Multi-item	Adapted from existing measures. Items on CSR practices were developed based on seven subjects of ISO26000 and their associated issues	China

in their study, Tang et al. (2021) adapted the measures used for CSR commitment in existing literature to the Pakistani context.

The efforts still remain limited in the development of new measures, with only a few studies considering and self-developing scales to measure responsible innovation and other related constructs in emerging Asian economies. Consequently, to tailor measures to the national, legislative, social, and cultural factors of the Asian countries, and to serve the main investigation need of the research itself, some studies have developed new measures. This is the case for Factor et al. (2013), Lee (2016), and Jiménez-Parra et al. (2018), that their studies developed new measures, starting from the need for specific research and following the work of other researchers in the West. However, taking into consideration the fact that for the few self-developed scales, the validity of constructs has not been provided, this implies a rising perspective to future developments of specific validated measures to better serve the Asian context.

Key definitions and theories

Key definitions

Responsible innovation is defined as "*taking care of the future through the collective stewardship of science and innovation"* (Stilgoe, Owen, et al., 2020). This study provides a snapshot of the key definitions of responsible innovation used in the extant literature to present dimensions and operationalization for future studies on this topic. The extant studies on responsible innovation use a variety of terms: 'socially sustainable innovation', 'responsible product and process innovation', 'incremental and radical responsible innovation', 'corporate social innovation', 'ethical and socially responsible innovation', 'socially responsible investing', 'eco-innovation', 'green innovation', 'cooperative-open innovation', 'climate responsible innovation', 'sustainability oriented innovation', 'responsible research and innovation' and 'environment-responsible innovation'. A majority of the scholars have defined responsible innovation from the sustainability perspective, incorporating *social, environmental, and economic dimensional outcomes*.

Key theories

The majority of the studies that we have included in this review have applied the resource-based view and stakeholders' theoretical perspectives to examine the responsible innovation phenomenon and its outcomes from *social, environmental, and economic* perspectives across a number of Asian markets. For example, in the context of the supply chain, the importance of investment in ***social responsibility*** practices in supply-chain performance has been emphasized (Mani et al., 2020). Upadhaya et al. (2018) apply the resource-based view, extending responsible innovation findings in the context of corporate social responsibility (CSR). Their study asserts that responsible innovation requires strong integration of an

economic dimension of CSR in business strategy for product and process innovations (Upadhaya et al., 2018), consequently affecting business performance (Ullah & Sun, 2021). Furthermore, it has been examined that when innovation is embedded in organizational culture, the organization is more likely to focus on responsible strategies and innovations such as eco-innovation (Pan et al., 2021). Likewise, Chang (2015) finds that organizational culture affects proactive CSR strategies and responsible green product innovation. Considering the ***environmental dimension,*** CSR practices towards RI should keep a balanced pursuit of economic growth, environmental protection, and social harmony (Wu et al., 2020) implying the importance of environmental, social and economic outcomes. Some studies taking environmental perspective, particularly in CSR domain have also studied environmental CSR as an antecedent of the responsible eco-innovation (e.g., Jiménez-Parra et al., 2018, Pan et al., 2021), and CSR innovation (Gao et al., 2017; Zhou et al., 2020). Particularly, the environmental perspective is considered as both outcome and antecedent in examining the influence of RI.

Resource-based and stakeholders' theories cut across the three-dimensional outcomes of responsible innovation. Stakeholder theory in responsible innovation literature has also been applied, together with agency theory. For example, applying these two theoretical lenses, Gugler and Shi (2009) argue that in China, CSR engagement and development is still a new concept to many business managers. Most companies are engaging in philanthropy as a substitute for CSR, and others adopt a 'wait and see' attitude for government regulatory pressures. They have concluded that for developing nations' governments, CSR poses challenges to national policies. Thus, a government should actively adopt labor standards performance and reporting criteria for the granting of government loans, grants, overseas investment insurance, or other benefits tied to CSR investment. Applying stakeholder theory, reputation building theory, and signaling theory, a recent study linked environmental disclosures to green innovation (Xiang et al., 2020). Combining stakeholder theory with an organizational theoretical perspective, corporate innovation capability has been linked to corporate sustainability (Lai et al., 2015). Effective organizational strategy, R&D technology, uncertainty in the environment, and stakeholders in the environment are outlined as prominent factors to ensure effective responsible innovation capability (Lai et al., 2015).

Institutional theory is also another prominent theory that has been applied in the context of responsible innovation (Graafland & Zhang, 2014; Yao et al., 2019). Applying the institution theory, Ortas et al. (2019) show that national institutions influence economic, social, and governance (ESG) performance. In this context, they find that regulatory states with high levels of knowledge and social capital are more committed to sustainability issues; consequently, they achieve higher levels of ESG performance. Furthermore, differences in country profiles of capital providers also drive companies' ESG performance. Applying the theory of professionalism with institutional theory and diffusion of innovation, one study examines and compares the CSR beliefs of managers with non-managers. The study further investigates whether these differences intensify over time and across nations (Factor et al., 2013). The authors show that both managers and non-managers have more favorable beliefs regarding CSR in low-inequality countries. Moreover, individuals in more

favorable work situations (e.g., those holding jobs with high income and advancement opportunities) have less strong beliefs regarding this. Applying new institutionalist theory, another study focused on socially responsible innovation and governance in the context of open and private equity fund investment, where there has been relatively little investment focusing on environmental issues. The study argues that responsible innovation is still in its formative stages, and there are opportunities for the development of rigorous corporate social performance analysis for investment institutions (Jun, 2016). Considering the resource-based and institutional theoretical perspectives, responsible innovation's scholarship has been extended by examining how innovation in industries encourages and discourages CSR practices (Anser et al., 2018). Similarly, underpinned by the perspectives of legitimacy and institutional theories, the pressure from the state government on CSR adoption and disclosures has also been examined (Dong & Xu, 2016). Finally, using a stand-alone institutional theory, the role of green management and government support in radical and incremental responsible innovation has been examined (Shu et al., 2014). A few studies have also used other macro level theories. For example, applying legitimacy theory, the impact of CSR on state- vs. non-state-owned organizations has been observed (Tang et al., 2021). Using the theory of deliberative democracy, the role of reflexive governance structures in addressing grand societal challenges in responsible innovation has been examined (Scherer & Voegtlin, 2020). Considering institutional level variables, economic theory has been applied in determining the role of CSR in national competitiveness in countries with relatively low innovative standing. In the context of such countries, the absence of a strong national innovation record can be compensated for through CSR-based differentiation strategies (Boulouta & Pitelis, 2014). Furthermore, in applying this theoretical lens, differences in CSR strategies of emerging vs. developed countries have been studied (Jamali et al., 2009), as they have in policy perspectives, e.g., consensus building in policy (Tasaki et al., 2019).

Scholars have also utilized innovation diffusion theory in examining responsible innovation across different contexts. For example, in the context of Taiwanese SMEs, compatibility and complexity are related to the willingness of SMEs to engage in CSR activities. It has been argued that SMEs need to become more compatible with CSR in their companies' culture, strategy, and corporate image in order to reduce the difficulties of implementing CSR (Hsu & Cheng, 2012). Consistent with this, another study has linked responsible behavior to the cultural values of the country and industry behaviors (Biggs & Messerschmidt, 2005). Another study considered various types of barriers in responsible innovation, e.g., economic, implementation, policy-related, societal, and technological (Ko et al., 2020). A further study has examined the similarities and differences in the adoption of ISO 26000 in the developing world and identified challenges pertaining to CSR innovation (Balzarova & Castka, 2018).

Some scholars took the perspective of organization theory in examining the social and environmental dimensions of responsible innovation. For example, the environmental and social dimensions of responsible supply chain management have been related to relationship commitment in Asian markets (e.g., Vietnam and South Korea), bringing opportunities for innovation and cost improvements

(Lee, 2016). Similarly, the theoretical applications' extensions into knowledge exchange and knowledge have been gained in the implementation of CSR activities (Mirvis et al., 2016).

Applying social capital theory, green entrepreneurial orientation was examined as a key driving factor of environmental performance (Shafique et al., 2021). Another study applied this theory to examine socially responsible supplier development in sustainable innovation and development (Wu, 2017). A few studies have used other theories, including sustainable consumption theory (Park, 2009) and the theory of ethics (Bardy et al., 2012), actor-network theory (De Hoop et al., 2016), norm activation theory (Dalvi-Esfahani et al., 2017) and the theory of inventive problem solving (Shrotriya and Dhir, 2018) in examining responsible innovation.

Synthesis of the key findings: an integrative conceptual framework

This section focuses on themes-based analysis of the studies that are incorporated into antecedents-phenomenon-consequence categories. Within each of these three categories, themes of the representative articles are reported, including theories and frameworks, and key results. Figure 2 schematically represents the key inter-relationships and synthesized findings.

The antecedents

The antecedents' category entails the driving factors for the unit of analysis, i.e., responsible innovation in the case of this systematic review. The drivers of responsible innovation in the context of Asian markets are grouped into organization vs. institutional levels.

Organizational-level antecedents in Asian markets

The review demonstrates that the majority of the studies at organizational level have been conducted in the context of China, India, and Korea. Below, we discuss the key antecedents that have been studied in these contexts.

China Stakeholder theory has been widely applied in studies in the context of China. Combining stakeholder with agency theory, existing studies have considered market demands for CSR innovation as a driving factor for social, responsible, productive, and less costly manufacturing processes (Gugler & Shi, 2009). Drawing upon the stakeholder and resource-based theoretical underpinnings, pressure to innovate was identified as a key antecedent for responsible innovation (Zhou et al., 2020). Applying stakeholder's perspective, the positive influence of environmental disclosure has been determined in regard to green innovation (Xiang et al., 2020). A resource-based perspective has also been considered in examining the role of environmental CSR in sustainable environmental innovation (Pan et al., 2021). Additional studies in

China have considered the role of employees (Yang et al., 2019), customers' advocacy (Yeh, 2015), norms and standards (Dong & Xu, 2016), technological, marketing, and management innovation (Zhu et al., 2019).

India In the context of India, the extant studies have examined the responsible innovation phenomenon by considering the effects of pressure from customers and stakeholders applying the stakeholders' resource based-view (Mani et al., 2020). Using the theory of inventive problem solving, one study points out technological skills as an important antecedent in responsible innovation (Shrotriya & Dhir, 2018).

Korea Organizational learning and innovation theories have been predominantly applied in studies conducted in the context of Korea. For example, a study conducted in Korea and Vietnam considers the role of environmental and social challenges such as global environmental regulations, global warming, and fair trade in responsible supply chain management (Lee, 2016). Another study has examined economic, implementation, policy, societal, and technological barriers in responsible innovation (Ko et al., 2020).

Nepal External pressure has been studied in the context of Nepal by applying stakeholders' perspective (Upadhaya et al., 2018).

Lebanon In the context of Lebanon, SMEs' inclination and relational attributes to CSR have been examined (Jamali et al., 2009).

Malaysia Norm activation theory was applied in the context of Malaysia to understand pro-social behaviors (awareness of consequences, ascription of responsibility,

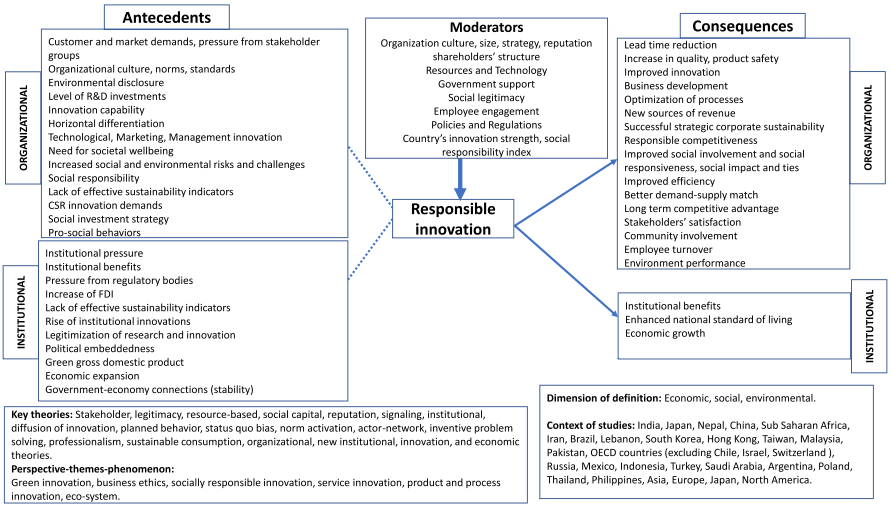

Fig. 2 Framework

and personal norms) in the adoption of green information systems (Dalvi-Esfahani et al., 2017).

Pakistan Entrepreneurial orientation for exploration and exploitation has been considered in the context of Pakistan by applying social capital theory (Shafique et al., 2021).

Institutional-level antecedents in Asian markets

At institutional level, the majority of the studies were conducted in the context of China and India.

China Considering the context of China, institutional theory has been mainly applied in understanding the antecedents and outcomes of responsible innovation in this market. Drawing upon institutional theory, one study considered key antecedents, including institutional pressure and benefits from government support and social legitimacy, as key moderating variables in responsible green innovation (Shu et al., 2014). Other studies applying the same theoretical perspective point out green domestic products (Graafland & Zhang, 2014) and increased market opportunities (Yao et al., 2019). Combining perspectives from institutional and legitimacy theories, Chinese economic expansion was outlined as a key driving factor in responsible innovation (Dong & Xu, 2016). Additional studies in China have considered environmental challenges such as resource depletion, environmental degradation (Jin, 2012), and political embeddedness as key drivers in responsible innovation (Cumming et al., 2021).

India Using institutional theory, one study considered the role of institutions in responsible innovation (Ortas et al., 2019). This study shows that regulatory states with a higher level of social capital and knowledge are more committed to sustainable and responsible innovations. As a result, they achieve a higher level of economic, social, and governance performance. Using actor-network theory, another study considers legitimization of research and innovation as a critical antecedent for responsible innovation (De Hoop et al., 2016).

While the majority of the studies on responsible innovation have focused on China and India, limited studies were conducted in other Asian contexts.

Korea Applying institutional theory, increased market investments have been considered for social investment strategies that drive organizational performance in the context of Korea (Jun, 2016).

Pakistan In the context of Pakistan, underpinned by legitimacy theory, the impact of corporate social responsibility has been examined for state-owned vs. non-state-owned enterprises' performance (Tang et al., 2021).

Africa Applying the theory of ethics, the influence of foreign direct investment (FDI) has been examined in promoting social and economic responsible development in the context of Africa (Bardy et al., 2012).

The consequences

We also clustered the reviewed articles' consequences of responsible innovation at organizational vs. institutional levels' thematic outcomes. First, we grouped the relevant studies that focused on organizational level outcomes in Asian markets. Second, we grouped studies that focuses on institutional level outcomes.

China In the context of China, various organizational level outcomes have been determined: for example, improved efficiency (Gugler & Shi, 2009), innovation, product safety, implementation of labor rights, environmental performance (Graafland & Zhang, 2014), long term competitive advantage (Gao et al., 2017), stakeholders' satisfaction, social image (Zhu et al. 2019), innovation performance (Wu et al., 2020; Xiang et al., 2020), sustainable environmental innovation (Pan et al., 2021), and employee turnover (Yang et al., 2019). At institutional level, institutional benefits have been found as a key consequence of responsible innovation (Shu et al., 2014). Studies in the context of China and Taiwan have shown that improved innovation performance and successful strategic CSR are outcomes of responsible innovation (Chang, 2015; Lai et al., 2015).

India All studies in the context of India explored organizational level outcomes, e.g., reduced lead time, increased quality and reliability of performance, increased competitiveness, economic growth (Shrotriya & Dhir, 2018, Mani et al., 2020).

Korea Like India, studies in the context of Korea also examined organizational level outcomes, including effective standards for responsible innovation, codes of conduct, and overcoming barriers to successful implementation (Jun, 2016; Ko et al., 2020; Lee, 2016)**.**

Pakistan Focusing on institutional outcomes in Asian markets, a study has also examined environmental performance in Pakistan (Shafique et al., 2021).

Comparative studies

While our systematic review revealed that the majority of studies were conducted in the context of China, India, and Korea, a few comparative studies have also been conducted in other Asian and international markets. For example, a study considering international perspectives (of China, India, Brazil, Russia, Mexico, Indonesia, Turkey, Saudi Arabia, Argentina, Poland, Thailand, the Philippines) has examined the role of CSR and the level of R&D investment in responsible innovation

by applying the stakeholder theory (Ullah & Sun, 2021). Applying stakeholders' perspective and considering OECD countries (excluding Chile, Israel, Korea, Switzerland, and Turkey) as the context, firms' engagement has been examined in determining the influence on eco-innovation, leading to environmental outcomes (i.e., reduced air pollution). Considering China and Taiwan as the context, another study has applied stakeholder and organization theory in pointing out horizontal differentiation as a key antecedent for innovation (Lai et al., 2015). Similarly, stakeholder and resource-based theoretical underpinnings, plus organizational culture, were studied for Chinese and Taiwanese markets in regard to green product innovation performance (Chang, 2015). In the same context (China and Taiwan), applying innovation diffusion theory, scholars have also considered difficulties in market competition (Hsu & Cheng, 2012), and by applying social capital theory, pressure from both regulations and market requirements have been considered as key antecedents of responsible innovation (Wu, 2017). In context of China and Taiwan, scholars also focus upon the role CSR and service innovation in customer loyalty (Yeh, 2015). Applying Beer's theory, a lack of effective sustainability indicators was studied in the context of India, Tanzania, China, and Iran in order to assess sustainability in supply chains (Isaksson et al., 2010). A study considers micro (organizational practices) and macro perspectives (the adoption process, e.g., early vs. late adoption processes) in adopting innovation standards to introduce responsible innovation in the context of Asia, America, Australia, and Africa (Balzarova & Castka, 2018).

There are also a handful of studies that have taken overarching international perspectives of the comparison of Asian vs. non-Asian markets by considering institutional perspectives. For example, a study comparing European, North American, and Asian countries found that stakeholders from low/middle income countries tend to concentrate more on sustainability issues (Tasaki et al., 2019). Specifically, in Asia, stakeholders from Japan put more importance on sustainability issues such as waste management. In another example, Ortas et al. (2019) examine how national institutions drive or restrict economic, social, and governance performance in Asia, Latin America, Africa, and Eastern Europe. Their study finds that firms in regulatory and welfare states with higher knowledge and social capital are more inclined towards responsible innovation. Differences in a country's profile of capital providers also drives economic, social, and governance performance. Companies in countries with developed equity obtain better economic, social, and governance outcomes than those in which the state is the primary source of financing. On a similar theme, Ringov and Zollo (2007) explore how national differences in cultural values across North America, Asia, and Europe impact firms' social and environmental performance. Their study finds that responsible innovation practices are driven by low tolerance for power distance. Individualistic societies are more receptive to responsible innovation practices than collective societies.

An organizational level study on numerous Asian markets (China, India, Brazil, Russia, Mexico, Turkey, Saudi Arabia, Argentina, Poland, Thailand, and the Philippines) have shown business performance as a consequence of responsible innovation (Ullah & Sun, 2021). A study conducted worldwide shows competitive advantage as a key outcome of responsible innovations (Mirvis et al., 2016). Another study taking the international perspective found development of effective policies and waste

reduction (Tasaki et al., 2019), while research on North American, European and Asian markets (Ringov & Zollo, 2007) found a higher level of social and environmental performance as other consequences. Taking an institutional perspective for OECD countries, reduction in air pollution has been determined as an important consequence of responsible innovation (Jiménez-Parra et al., 2018).

Integrative conceptualization and theoretical perspectives

The theme-based analysis of studies provided valuable insights. As regards antecedents' categories emphasis was paid to both organizational and institutional drivers. However, a very limited number of studies took perspectives of both organizational and institutional drivers simultaneously. The phenomenon category captured the least attention for developed markets, as most research focus in the context of Asia considers China and India. However, a few studies considered other markets such as Korea, Pakistan, and Taiwan. The consequence category has gained attention in organizational level outcomes. A few studies have considered institutional level consequences. Very few studies have been conducted at international level, or comparative studies such as Asian vs. Western markets, on organizational and institutional drivers of responsible innovation. The integrative framework of responsible innovation research in Asia (depicted in Fig. 2) represents an overview of the antecedents, definitional dimensions, themes, levels, theories, and outcomes studied for this phenomenon.

At organizational level, there has been a good balance of organizational level antecedents and outcomes studied. This captures a more concrete theoretical picture in terms of amount, range, and foci of elements researched. However, at institutional level studies, an imbalance between antecedents and outcomes was noted. The majority of scholars' focus was on institutional level antecedents (government economy connections, pressure from regulatory bodies) or moderators (e.g., government support, policies and regulations, and legitimacy). The findings point out that the presence of institutional pressure and benefits, legitimacy, government economy connections, and FDI challenges influence responsible innovation practices. The more obvious pattern is to consider institutional level outcomes and comparative groups (MNEs vs. locals, Asian vs. Western markets).

Overall, no apparent pattern has emerged for the theories used. However, stakeholder, resource-based, innovation diffusion, institutional, and legitimacy theories have mostly been applied individually or in combination with other theories. It is noteworthy that while institutional theory is commonly applied, only two studies in the review considered institutional level outcomes. A very few scholars have applied other perspectives, such as the theory of innovation considering social responsibility, responsible research innovation, and technological innovation, while others have also applied social capital (Shafique et al., 2021; Wu, 2017), sustainable consumption (Park, 2009), the theory of ethics (Bardy et al., 2012), the actor-network theory (De Hoop et al., 2016), and the theory of inventive problem solving (Shrotriya & Dhir, 2018), considering entrepreneurial orientation and social strategies towards RI.

As mentioned earlier, the majority of studies analyzing RI at the organizational level have predominantly applied the resource-based view and stakeholder theoretical perspectives in the context of Asian markets. The stakeholder theory is mainly applied by considering the market pressures and stakeholders' pressures in enacting responsible innovation, while the resource-based view considers resources such as levels of R&D investments and innovation capability.

Institutional theory is applied for institutional level and organizational level determinants of responsible innovation. For example, at an institutional level, one study considers a role of institutional benefits and pressures in responsible innovation (Shu et al., 2014). Another study considers the green domestic product (Graafland & Zhang, 2014). At organizational level, scholars also consider the challenges and risks pertaining to society and the environment (Ringov & Zollo, 2007). Applying legitimacy theory, scholars have considered the role of economic expansion in responsible innovation (Dong & Xu, 2016). Scholars have also applied economic theory in understanding the role of policy pressures (Boulouta & Pitelis, 2014). The theory of deliberative democracy has been applied to study grand challenges pertaining to responsible innovation considering the role of government structure (Scherer & Voegtlin, 2020). The theory of ethics has been applied in considering the role of foreign direct investment (FDI) (Bardy et al., 2012) and the theory of actor-network considers the demand for legitimization of research and innovation (De Hoop et al., 2016).

Finally, key definitional dimensions show some interesting patterns in accordance with variations to the context (e.g., eco-innovation, green innovation, climate responsible innovation, socially responsible innovation, etc.). From a methodological perspective, two of the reviewed studies adopted mixed methods (survey and interview, n = 1, survey and observations, n = 1). Fourteen studies adopted a qualitative approach (reviewed articles, n = 6; case-studies, n = 3; ethnographic fieldwork, n = 1; interviews, n = 3; observations = 1) and the remaining were quantitative studies.

Discussion and Conclusion

This systematic review presents a snapshot of the current stage of research and limitations in responsible innovation, as well as some fruitful avenues to extend this important topic. The future research directions are extracted from the knowledge gained through a synthesis of the results presented in Sect. 3. These synthesis-stemming future research directions expand the spectrum of questions to multidisciplinary areas in the context of Asian markets and their comparisons with Western markets. Our synthesized findings suggest several knowledge gaps, theoretical inconsistencies, and contextual gaps. To enhance the impact of research on this topic, we argue that stronger theoretical grounding, methodological diversity, and contextual positioning is required.

Sourcing future research and general directions

Axis 1: theory

From the theoretical perspective, the research in responsible innovation has primarily relied upon innovation diffusion, stakeholders, resource-based, and institutional theory to understand the antecedents and consequences of responsible innovation. Our systematic review of the literature on responsible innovation suggests that scholars have utilized these theories in a complementary manner, rather than highlighting the current tensions in the underlying assumptions of any given theory. Future works should address the underlying tensions across different theories, such as the stakeholders-based view vs. the resource-based view and examine not only the positive consequences of responsible innovation, but also focus on the negative impact of responsible innovation. For instance, employees might have to work extra hours to come up with creative ideas for responsible innovation, which may impact their wellbeing, or firms might use technology that is not conducive for enacting responsible innovation, thus greater attention should be paid to examining both positive and negative consequences of responsible innovation.

Future research can also consider other important theories, such as the resource dependency and behavioral theory of the firm. Institutional theory has made great strides and provided useful insights in exploring various phenomena, including CSR and responsible innovation, and there is scope for future studies to apply national business systems and comparative institutional perspectives and thereby shed light on the organizational level antecedents and moderators such as competitors' pressure or institutional distance and responsible innovation. As the institutional environment varies across markets and subnational institutional factors might facilitate or hinder responsible innovation, future studies could thus pay more attention to how organizations based in resource-constrained environments handle institutional pressure and establish legitimacy when it comes to enacting responsible innovation. In this context, organizations might imitate their competitors' responsible innovation, therefore future studies could examine how such imitative strategies work, or whether these are useful for developing responsible innovation. Studies examining these issues could leverage legitimacy and reputation-building perspectives, and thus examine responsible innovation across different types of firms, such as SMEs, the public sector, and private companies.

Future studies could also apply organizational learning and agency theories and shed light on the moderators, such as the role of the board of directors and gender diversity, as well as exploratory and exploitative learning, and how these influence the development of responsible innovation. Managers might pursue their personal interests while meeting the expectations of diverse stakeholders through responsible innovation, therefore future studies need to examine how such private benefits are curtailed or enhanced through the prevalent institutional environments of the managers and their firms.

Axis 2: methodology

As responsible innovation is still a very young field of research in Asia, and is clearly in an early stage, there is a relevant methodological gap in existing knowledge. Drawing on this systematic review, we can clearly identify the need for more qualitative research in the field, as most studies reviewed use a quantitative approach. The lack in qualitative research can possibly be related to the difficulties in analyzing qualitative data. Moreover, most of the studies included in this systematic review focus on a limited sample of stakeholders and include only a few categories of participants. Future research should consider a more holistic approach and draw on broader samples to include diverse perspectives in the process. This will bring research on responsible innovation to another level, providing useful managerial, practical implications, and evidence for policymakers and governments to focus resources on the development of responsible innovation.

Another important consideration, which leaves room for future research, relates to the measures used in the studies reviewed. To measure responsible innovation in Asia, researchers use, adapt, or develop specific measures. We can identify three levels of measure development. In some studies, researchers use only the existing measures as they were developed for Western countries, without any possible modification. At a higher level, they try to adapt the existing measures to the Asian context, modifying actual constructs or adding new features to be considered. Finally, at the highest level, researchers develop new scales for the Asian context of responsible innovation. Considering that out of the total studies in our sample, only a limited number of studies, specifically three studies, self-develop measures that fit mostly to the Asian context of the phenomenon, there is a clear need for future research to focus on developing measures for this context. The major justification underlying such a need is the fact that responsible innovation in Asia may be shaped by cultural, socio-economic, and political factors, thus implying that measures developed for Western countries need to be further evaluated, modified, or reassessed in this specific context.

Lastly, we can recommend the usage of mixed methods research, which in this review was very little explored, as a way of providing a superior outcome to mono-method studies. This will help researchers overcome the weaknesses of conducting only qualitative or quantitative research and will result in a better understanding of the phenomenon and complementary strengths (Johnson & Onwuegbuzie, 2004).

Axis 3: context

From a geographic reach perspective, there is a clear bias towards China, India, and Korea, while other important Asian markets such as Pakistan, Malaysia, and Indonesia have largely remained ignored. For robustness, we suggest that future studies should pay more attention to these underexplored geographic contexts. This is because overreliance on specific markets may pose generalizability concerns. We urge scholars to partner with academia or industries in other underrepresented countries in order to acquire a deeper contextual understanding.

This could also help in accessing the data. Moreover, little attention has been given to comparative studies. Future studies can compare different Asian markets, or Asian markets with Western markets. Furthermore, Asian markets may have unique historical, cultural, and institutional attributes that serve as a good ground for theoretical advancements. This points out that comparative studies can also consider economic, geographical, social, and institutional characteristics as independent, mediating, or moderating variables. Within these streams, future studies could focus on industry-related regulations and market dynamism as potential moderators. Another limitation of this study is a lack of focus on different types of firms. For example, the majority proportion of studies in this review of the extant literature focuses on manufacturing industry, followed by a few studies on service industries. Thus, future research could be extended to other important sectors such as energy, steel, aerospace, legal and financial services in the respective markets studied. In terms of firms' characteristics, most studies were randomly sampled, using databases or listed stock exchanges, while others specifically focused on SMEs. Future studies could also examine the topic in the context of large local firms vs. large MNEs, large firms vs. SMEs, new business entities, as well as state-owned enterprises (SOEs). Further contextual gaps emerged pertaining to institutional level conditions and theory being applied and studied for organizational level outcomes. Thus, a potential avenue to extend research is to consider institutional level outcomes such as institutional stability. Finally, there is scope to study mediating-moderating mechanisms, as this will provide better insights into the conditions under which the effectiveness of responsible innovation can be strengthened.

Conclusion

To conclude, our analysis has responded to several calls for the development of a structured and systematic overview and critical analysis in an under-researched but highly important region of the world, namely the Asian region. This study has assisted in mapping the developments in responsible innovation along the specific characteristics, both macro and micro, in the Asian region. Added to this, both the critical and comprehensive analysis and synthesis of the results, as well as the development of an integrated conceptual framework, has helped us to confidently propose an agenda for future research, thus contributing to the expansion of the boundaries of the domain into new research paths and establishing the basis for the concept of responsible innovation to develop further in the region. From a managerial perspective, considering the ability of responsible innovation in supporting businesses for implementation of SDGs at the level of the firm required by the UN Agenda 2030 (Imaz & Eizagirre, 2020), and the opportunity to improve socio-ethical practices of doing business, as adopting a moral responsibility to respond to important societal and environmental challenges, this study proves useful to increased stakeholder engagement, improved legitimacy and reputation, as well as improved efficiency along with several institutional benefits and economic growth (Iazzi et al., 2020).

More specifically, a common interest to implementation of RI practices has subsequently been seen as a solution to societal and environmental challenges that Asian countries are facing and paying consequences. RI despite being a step towards improved environmental performance, while we must consider that some of the Asian countries account for the biggest polluters of the environment (Chien et al., 2021), is also contributing to economic growth, improved quality of life and reduced poverty (Tseng et al., 2013; Herrera, 2016). Therefore, we can acknowledge our findings as theoretically and managerially useful to nurture the debate on responsible innovation in the Asian region.

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