Why Knowledge Management for Sustainability needs a Sustainability Mindset

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Abstract: Although the United Nations (UN) Sustainable Development Goals (SDGs) express urgency for actions, the UN also reports that reaching these goals as planned is very challenging. It has been argued that a mindset paradigm shift is needed and this paper will show that knowledge management (KM) can play an important part in this shift. Knowledge of sustainability is often complex, systemic and hard to capture (tacit), leading to specific challenges in its management. To address these, a three-step process, DCA, had been proposed beginning with defining (D) what knowledge is needed, then collecting (C) and acting (A) upon it. Focusing specifically on the defining step (D) and on tacit knowledge as the most challenging aspects, the paper proposes two improvements: first, to integrate Nonaka et al's SECI model (Socialize, Externalize, Combine, Internalize) that describes how tacit knowledge can be externalized and shared. Secondly, the Sustainability Mindset by Rimanoczy is proposed as framework that aligns values and allows discovery and formulation of tacit sustainability knowledge along its content areas and principles. It is posited that when tacit understanding becomes more tangible, shifts in mindset can occur more readily, and vice versa, that a broadened mindset eases sense-making of tacit knowledge, thus creating a cycle of growth and change for the organization. The Sustainability Mindset Indicator (SMI), a personal development tool is proposed to operationalize the development of the sustainability mindset, and said exploration of tacit knowledge, which combined with tools from the SECI model may offer managers concrete tools to define the knowledge their organizations need on their pathway to change towards sustainability and fulfillment of SDGs.

Keywords: sustainability mindset, tacit knowledge, SECI model, sustainability mindset indicator, knowledge management

1. Introduction

In 2015, the "2030 Agenda" of the United Nations (UN) formulated Sustainable Development Goals (SDGs) (United Nations, 2015). The 2021 SDG report (United Nations, 2021) clearly states that while there has been progress, many SDG goals are not on target, with further setbacks from the COVID-19 pandemic. Furthermore, the 2021 report of the Intergovernmental Panel for Climate Change (IPCC) sounded the alarm for the state of the planet, labeled "code red for humanity" by the BBC (McGrath, 2021). Elkington (1994), the "father" of the triple bottom line (TBL) indicates that the TBL concept – as he envisioned it - has been unsuccessful. He suggests that what is needed now is not a different "accounting" practice but instead a radical intent "to stop us all from overshooting our planetary boundaries" (Elkington, 2018). With the above intents, why haven't sustainability and climate goals been reached?

One can address this question from various lenses. Here we advocate for a shift in leader mindset to facilitate deliberate change management. This idea is not without precedent. Davis-Peccoud, Stone and Tovey (2017) suggest that leaders need a new mindset and clear public commitment to successfully implement sustainability programs. Rimanoczy and Llamazares (2021) discuss a paradigm shift that moves society from the epistemological pillars of mechanism, fragmentation, materialism, determinism, rationalism and competitive individualism to what they call a sustainability mindset. They argue (referencing Meadows (1999) on systems change) that to accomplish change of a system, one needs to address the mindset that is behind it as a mere attempt to fix the symptoms will prevent discovering and addressing systemic causes (Feygina, 2013; Seiffert and Loch, 2005; Waddington and Fennewald, 2018). Rimanoczy posits that mindset shift is a prerequisite for individuals and leaders to break out of an anthropocentric view and develop into champions for the planet (Rimanoczy, 2021a). Ritz (2021) calls a sustainability mindset a requirement for a transformative and connective leadership style, which is needed to address today´s global challenges.

Such changes in paradigms call for broad adjustments across all value chain and societal activities. Frameworks that guide managers through sustainability change exist (Doppelt, 2003; Dunphy, Griffiths and Benn, 2003; Lueneburger and Goleman, 2010). Yet, organizations are challenged by the scope of change and the management of it (Sloan, Klingenberg and Rider, 2013). This is compounded by managers and employees often lacking the needed knowledge and skills to implement them (Soyka, 2012; Klingenberg & Kochanowski, 2015).

Dunphy, Griffiths and Benn (2003) emphasize that leaders need to have relevant knowledge to be sustainability change agents. Lacy, Haines and Hayward (2012) confirm that the dearth of sustainability programs is often due to middle and senior management deficits in skill and knowledge of sustainability concepts, while Haugh and Talwar (2010) even call it "a leap of faith" to assume familiarity with such concepts. Managers need a sustainability road map to success.

Knowledge and intellectual capital management have been recognized as essential strategic pillars for firm success (Gupta & McDaniel, 2002; Snyman & Kruger, 2004; Halawi et al., 2005), for successfully navigating change or as a driver of sustainability (Matos et al., 2017; 2019). However, the role of knowledge and knowledge management (KM) for sustainability is not widely researched (Klingenberg & Rothberg, 2020). Most approaches focus on processes internal to the organization, such as organization-wide dissemination (Mohamad, Stankosky and Mohamad, 2009; Mohamad, Murray and Mohamad, 2010; Iazzolino and Laise, 2016; Iazzolino, Laise and Gabriele, 2017), or knowledge creation, capturing and dissemination (de Marchi and Grandinetti, 2013; Carayannis et al, 2017; Albort-Morant, Leal-Rodríguez and De Marchi, 2018). Meilnschmidt, Foerstl and Kirchoff (2016) on the other hand indicate the importance of identifying and recognizing external knowledge of sustainability concepts, prior to collecting said knowledge, while He at al. (2019) argue that knowledge identification is an essential first step. These observations influenced a three-step process of knowledge management for sustainability, DCA, beginning with defining (D) what knowledge is needed, then collecting (C) and acting (A) upon it (Klingenberg & Rothberg, 2020).

The first step, defining (D), specifically requires understanding what one is looking for. Knowledge about sustainability, however, is difficult to access due to its holistic, systemic, (Benn and Martin (2010), Williams et al, 2017; Klingenberg, Rider and Sloan, 2021) and transdisciplinary character (Schneidewind, 2010). Schneidewind (2010) and Parletow (2016) break it down into three components: system, target and transformative knowledge. System knowledge covers the functionalities and connections of socio-ecological systems. This knowledge develops into transdisciplinary target knowledge that defines sought-after goals as well as transformative knowledge that triggers change processes.

Furthermore, such knowledge is often hard to capture. Benn and Martin (2010) found in their study of a Chinese agricultural sector that many of the sustainable practices exercised by the farmers were based on tacit knowledge. Wilson and Rezgui (2013) describe that sustainability related knowledge in Small- to Medium-sized enterprises (SMEs) in the United Kingdom´s (UKs) construction industry was often tacit. A case study involving the Italian wine industry points to the importance of tacit knowledge of sustainability practices (Klingenberg et al, 2020). Hence, any model for the management of sustainability related knowledge encompasses a challenge well known in knowledge management, namely that of turning tacit into explicit knowledge.

The purpose of this paper is to further develop the "Define (D)" step of the DCA framework by considering the three knowledge types (system, target and transformational) and its partially tacit character. As explained, most research thus far explored processes internal to the organization, represented by "Collect (C)" and "Act (A)" of the DCA model, while the step of defining (D) is less researched, although of high importance and challenging due to the complexity of knowledge that requires defining. Therefore, this paper focuses on "D". Furthermore, tacit knowledge is emphasized, as its counterpart, explicit knowledge, can be defined with more ease. The overall objective is adding tools for managers that want to support the learning and change-capacities of their organizations by providing them with effective knowledge management processes for the most challenging part, the defining of tacit knowledge. It is posited that when tacit understanding becomes more tangible, shifts in mindset can occur more readily, and vice versa, that a broadened mindset eases sense-making of tacit knowledge, thus creating a cycle of growth and change for the organization.

The paper is structured as follows: The next section defines tacit knowledge and the SECI knowledge management process (Nonaka and Takeuchi, 1995), and pairs it with the Sustainability Mindset (Rimanoczy, 2021b). The comparison of assumptions and elements of these two concepts guides the deductive development of a new framework for knowledge management for sustainability, specifically, it is suggested that this pairing can yield common values for managing sustainability related tacit knowledge. In the third section, the Sustainability Mindset Indicator (SMI) is offered as a practical implication, a concrete tool that can accompany leaders and the organization in their transformation towards a sustainability mindset. The final section summarizes the proposed new framework and discusses limitations and future research.

2. Tacit knowledge, its management and the mindset

Nonaka and Takeuchi (1995) define tacit knowledge as knowledge that is difficult to formalize and communicate as it is rooted in perception, human behavior and in the mind. It is individualized, and often difficult to explain, as it can be subconscious (Stenmark, 2001), and thus incommunicable (Polanyi, 1967). Furthermore, it is embedded in cognitive processes, formed by individual culture and values (Daft and Lengel, 1986; Stenmark (2001).

Nonaka and Takeuchi (1995) provide a well-known framework for organizational learning of tacit knowledge: the SECI model. It consists of four steps: socialization (S), externalization (E), combination (C) and internalization (I). Step one, socialization, shares tacit knowledge, for example through sharing experience, face-to-face communication, visits etc. ("originating", tacit to tacit knowledge). Through externalization, this knowledge is made explicit, for example through brainstorming, road mapping, scenario planning ("dialoguing", tacit to explicit knowledge). Explicit knowledge is then combined (systemizing) into scenarios, foresight plans or learning packages (explicit to explicit). During the last step of internalization ("exercising"), the now available body of explicit knowledge is implemented, which converts it into new, tacit knowledge (explicit to tacit). The SECI model is then, according to Nonaka and Takeuchi (1995) a virtuous cycle of empathy to develop a sense for knowledge sharing. It appears to be a suitable model to further develop the defining (D) step to better capture tacit components of system, target or transformational knowledge. As explained in a later section, change towards sustainability, enabled by a mind-set shift, is also driven by empathy (Rimanoczy, 2010), hence the driving force for change and knowledge sharing is the same.

However, the aforementioned attributes of tacit knowledge create various difficulties: as tacit knowledge is embedded in individual culture and values, socializing to share such knowledge may be challenged when values between sharing partners do not align (Haag, Duan and Mathews, 2010). Hence, Elkington´s "radical intent" can only take hold if managers understand what needs to be changed. If sustainability knowledge is difficult to formalize, maybe individualized or even subconscious, and influenced by individual culture and values, then leaders who are not aware of these facets may experience difficulties in communicating clear goals (Davis-Peccoud, Stone and Tovey (2017). As values are routed in personal and societal preferences (Rokeach, 1973), managers first need a framework to guide understanding the context of value and culture. Then tapping into the pools of tacit knowledge to "Define (D)"- what the organization needs to know, develop processes that make this knowledge accessible and allow the development of target and transformational knowledge from system knowledge becomes easier. As Davis-Peccoud, Stone and Tovey (2017) call for a new mindset that is needed to enable business leaders to act towards sustainability, the sustainability mindset (Rimanoczy, 2021b) is proposed as the unifying, managerial framework that aligns unconscious values.

On the surface, the focus of sustainability initiatives is often on visible performance. Rimanoczy (2021a), in adapting the All Quadrants All Levels (AQAL) model (after Wilber, 2005) recognizes this visible, or external side of sustainability, expressed by individuals through behaviors, habits, initiatives and leadership, and for the collective, through regulation, innovations, solutions, programs and institutions. On the internal side, the focus of the sustainability mindset, is the individual´s values, beliefs, purpose, mission and identity, as well as collective assumptions and worldviews (Rimanoczy, 2021a). Kassel and Rimanoczy (2016, p.7) define this mindset as "a way of thinking and being that results from a broad understanding of the ecosystems' manifestations, from social sensitivity, as well as an introspective focus on one´s personal values and higher self and finds its expression in actions for the greater good of the whole" (p.7). This mindset is becoming the common ground to align values across the organization. On the basis of the mindset, managers and employees can understand the contexts of tacit knowledge, create an atmosphere open and responsive to socialization of this knowledge. As empathy is a key prerequisite to lead organizations towards sustainability (Rimanoczy, 2010) and serves as a fundamental value of the sustainability mindset, it then aligns to the driver of the virtuous cycle of the SECI model.

The sustainability mindset is structured into four content areas and twelve principles (SMPs) (Rimanoczy, 2021b). Table 1-4 (modeled after Rimanoczy and Klingenberg, 2021) provide an overview of these, per content area. The tables also indicate proposed levels of tacit knowledge, as well as the knowledge type (system, target and transformational). This creates a tool to operationalize the defining "D" step: managers can explore each content area, and within it, each principle to discover which knowledge of sustainability may be needed or supportive for the aimed at change towards sustainability. It then becomes clear that the mindset is not just the

common value ground, but includes tacit knowledge. In other words, the sustainability mindset is viewed not just as a prerequisite to untap the socialization stage of tacit knowledge sharing, but is by itself a source for knowledge.

Table 1: SMP content area Ecoliteracy

Content Area Ecological Worldview	**Definition (Rimanoczy, 2021b)**	**Tacit Knowledge**	**Knowledge Type**
Ecoliteracy	Understanding of the state of the planet in order to increase awareness of the challenges, the complexity of their interrelation, feelings about them.	Some	System Target Transformational
My Contribution	Identification of how we are contributing to the problems, in order to create chances to act.	Some	System Target Transformational

"Ecoliteracy" encompasses the knowledge about and understanding of the ecological systems of the planet and our social systems. It therefore consists of system knowledge, but this knowledge also generates targets, e.g., where these systems should operate. Similarly, "My contribution" addresses the understanding of how daily actions impact the planet and society, which is system knowledge. This promotes identification of targets for change in habits. Many aspects of this knowledge are explicit; as e.g., natural sciences allow us to describe ecosystems precisely. However, tacit knowledge such as indigenous wisdom, also fall into this content area.

Table 2: SMP content area Systems Thinking

Content Area Systems Perspective	**Definition (Rimanoczy, 2021b)**	**Tacit Knowledge**	**Knowledge Type**
Long-term thinking	Creating positive impact on global sustainability through long-term thinking.		Target Transformational
Both-and-Thinking	Inclusiveness of all stakeholders to create fair and peaceful societies	Yes	Target Transformational
Flow-in Cycles	Recognizing the cyclical character of all natural processes	Yes	System Transformational
Interconnectedness	Understanding the connectedness of individuals and consider diversity	Yes	System

In the content area of Systems Thinking, knowledge of the principle of "Long-term thinking" is explicit, as we can define time frames clearly; however, the other principles in this content area all carry tacit or intuitive knowledge. Thinking in the long-term as well as the inclusiveness that is represented in "Both-And-Thinking" set automatically targets the future. This brings forward transformational knowledge, as it generates ideas about how to reach these targets. Recognizing that all and everything is governed by the cyclical flow presented in nature is by itself system knowledge, but also transformational, once this cyclicality is accepted and one becomes part of the constant flow it generates. Understanding the self as a part of an interconnected system is also system knowledge.

Table 3: SMP Content area Emotional Intelligence

Content Area Emotional Intelligence	**Definition (Rimanoczy, 2021b)**	**Tacit Knowledge**	**Knowledge Type**
Creative Innovation	Acknowledging non-traditional wisdom and using intuitive knowing, non-verbal information, creativity and imagination	Yes	Transformational
Reflection	Reflective practices to ponder implications prior to acting	yes	Target Transformational
Self-Awareness	Exploring personal beliefs, values and assumptions	Yes	Target Transformational

The content area of Emotional Intelligence (which in the context of the Sustainability Mindset is not as all-encompassing as the term is generally used, e.g., by Goleman, 1995), with its principles "Creative Innovation", "Reflection" and "Self-Awareness" reaches into the tacit knowledge everybody carries. The latter two principles

formulate target knowledge of practices and actions, that becomes transformational as a person acts upon them.

Table 4: SMP content area Spiritual Intelligence

Content Area Spiritual Intelligence	**Definition (Rimanoczy, 2021b)**	**Tacit Knowledge**	**Knowledge Type**
Oneness with nature	Understanding that we are a species within species	Yes	System Target Transformational
Purpose	Definition of our purpose as an unconscious compass to help shaping a better world.	yes	Target Transformational
Mindfulness	Enhancing awareness and compassion towards social and environmental actions	Yes	Target Transformational

Spiritual Intelligence is often the result of tacit knowledge, which is reflected specifically in the principle of "Oneness with Nature". This embodies knowledge of the natural system, and generates targets for behavioral patterns and transformational knowledge, for example the development of different approaches towards agriculture and eating habits that better reflect planetary realities. Having an unconscious compass ("Purpose") and being aware of and compassionate about social and environmental actions ("Mindfulness") sets targets and is thus per se transformational, as leaders formulate explicit goals and objectives for their organizations.

These reflections demonstrate the richness of knowledge embedded in the sustainability mindset. It encourages the contemplator to become open-minded and use rational thinking *and* affection to trigger action. If embedded in an organization it furthermore encourages sharing (socialization) of tacit knowledge, thus providing common values and beliefs that enable managers to seek the knowledge needed to move the organization towards sustainability.

3. Practical considerations

The objective of this paper is to provide managers with better tools for knowledge management towards sustainability. While managing explicit knowledge is easier, much of the knowledge for sustainability is tacit. Extending the DCA model to include the SECI model considerations for "D" – Define - can facilitate the task of tapping into said tacit knowledge. Furthermore, the paper argues that the Sustainability Mindset (Rimanoczy, 2021a) can be a guiding framework for managers to identify the needed knowledge. If a mindset change is a prerequisite for aligning internal and external values, how can managers support such a shift throughout the organization? A concrete tool exists in the Sustainability Mindset Indicator (SMI), a personal development tool that supports individuals on their journey towards such a mindset (Rimanoczy and Klingenberg, 2021). Working with the SMI allows individuals and groups to further their knowledge of the different content areas of the sustainability mindset. As explained in the previous section, this should allow discovering tacit (and explicit) knowledge along the dimensions of system, target and transformational knowledge. Paired with, for example, face-to-face exchanges or joint experiences, and followed by, for example, brainstorming or road mapping, an organization can operationalize the socialization and externalization steps of the SECI model, thus feeding the gained knowledge into the "D" (Define) step of the DCA model.

In the past, other tools for mindset shift were developed and should be mentioned: Competencies Assessment of Responsible Leadership (CARL, Muff, Liechti and Dyllick, 2020); SQ21 (21 Competencies for spiritual intelligence, Wigglesworth, 2014, and SCTi-MAP (Leadership maturity levels, Cook-Greuter, 2004). These tools may also be of interest to encourage individual and organizational mindset shifts. Exploring the suitability of their use to generate a similar cycle of exploring, generating and externalizing tacit knowledge for sustainability, goes, however, beyond the scope of this paper.

4. Conclusions, Limitations and Outlook

This paper started with the question why progress towards sustainability appears to be slow, regardless of alarming reports about the health of the planet, and endless calls for action? It recognizes that one of the driving forces of the required change is knowledge and KM. While frameworks for both in the context of sustainability exist, it still seems that they are not sufficient. Given the systemic nature of knowledge about sustainability, and the fact that it itself contains system, target and transformational knowledge, and often tacit knowledge, it is

posited that this could be addressed in the following way: Application of the SECI knowledge management model (Nonaka and Takeuchi, 1995) to help Define (D) what knowledge is needed can facilitate tapping into the pool of tacit knowledge. However, to align underlying value systems and to move from the focus from external aspects of sustainability towards internal ones, a mindset shift is needed. The Sustainability Mindset and its principles (SMPs) as well as the Sustainability Mindset Indicator (SMI) are suggested as a pathway and concrete tool to create joint value systems, to discover tacit knowledge that can then be externalized. The SMPs provide a rich source of knowledge about sustainability, that can unleash organizational change when combined with adequate KM processes.

However, limitations exist. The SMPs and the SMI are established, however, the presented framework of combining them with KM processes is thus far a theoretical, deductively developed framework. Furthermore, other mindset tool mentioned in the previous section where not yet considered. The authors intend on finding organizations willing to engage in trials of the proposed framework to generate empirical guidance.

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References

Albort-Morant, G., Leal-Rodríguez, A.L. and De Marchi, V. (2018) Absorptive and relationship learning mechanisms as complementary drivers of Green Innovation Performance, *Journal of Knowledge Management*, Vol. 22, No.2, pp. 432-452.

Benn, S. and Martin, A. (2010) Learning and change for sustainability reconsidered: a role for boundary objects, *Academy of Management Learning & Education*, Vol. 9, No. 3, pp. 397-412.

Carayannis, E.G., Grigoroudis, E., Del Guidice, M., Della Peruta, M.R. and Sindakis, S. (2017) An exploration of contemporary organizational artifacts and routines in a sustainable excellence context, *Journal of Knowledge Management*, Vol. 21, No. 1, pp. 25-56.

Cook-Greuter, S.R. (2004) Making the case for a developmental perspective, *Industrial and Commercial Training*, Vol. 36, No. 7, pp. 275-281.

Daft, R.L. and Lengel, R.H. (1986) Organizational information requirements, media richness and structural design, *Management Science*, Vol. 3, pp. 554-571.

Davis-Peccoud, J., Stone, P. and Tovey, C. (2017) Fighting sustainability inertia, *Stanford Social Innovation Review*, Vol. 15, No. 3, pp. 59-60.

De Marchi, V. and Grandinetti, R. (2013) Knowledge strategies for environmental innovations: the case of Italian manufacturing firms, *Journal of Knowledge Management*, Vol. 17, No.4, pp. 569-582.

Doppelt, B. (2003) *Leading Change Towards Sustainability: a Change-Management Guide for Business, Government and Civil Society*, Greenleaf Publishing, Sheffield.

Dunphy, D., Griffiths, A. and Benn S. (2003) *Organizational change for Corporate Sustainability*, Routledge, New York.

Elkington, J. (1994) Towards the sustainable corporation: win-win-win business strategies for sustainable development, *California Management Review*, Vol. 36, pp. 90-100.

Elkington, J. (2018) 25 years ago I coined the phrase "Triple Bottom Line". Here´s why it´s time to rethink it, *Harvard Business Review*, Vol 25, pp. 2-5.

Feygina, I. (2013) Social justice and the human-environment relationships: common systemic, ideological, and psychological roots and processes, *Social Justice Research*, Vol 26., No. 3, pp. 363-381.

Goleman, D. (1995) Emotional Intelligence – why it can matter more than IQ, Bantam, New York.

Gupta, A. and McDaniel, J. (2002) Creating competitive advantage by effectively managing knowledge: a framework for knowledge management, *Journal of Knowledge Management Practice*, Vol. 3, No. 2, pp. 40-49.

Haag, M., Duan, Y. and Mathews, B. (2010) The impact of culture on the application of the SECI model, in: *Cultural implications of knowledge sharing, management, and transfer – Identifying competitive advantage*, D. Harorimana (ed)., Informational Science Reference, Hershey, pp. 26-47.

Halawi, L.A., Aronson, J.E. and McCarthy, R.V. (2005). Resource-based view of knowledge management for competitive advantage, *The Electronic Journal of Knowledge Management*, Vol. 3, No. 2, pp.75.

Haugh, H.M. and Talwar, A. (2010) How do corporations embed sustainability across the organization? *Academy of Management Learning and Education*, Vol. 9, No. 3, pp. 384-96.

He, Q., Gallear, D., Ghobadian, A. and Ramanathan R. (2019) Managing knowledge in supply chains: a catalyst to triple bottom line sustainability, *Production Planning & Control,* Vol. 30, No. 5-4, p. 448-463.

Iazzolino, G. and Laise, D. (2016) Value creation and sustainability in knowledge-based strategies, *Journal of Intellectual Capital,* Vol. 17, No.3, pp. 457-470.

Iazzolino, G., Laise, D. and Gabriele, R. (2017) Knowledge-based strategies and sustainability: a framework and case study approach, *Measuring Business Excellence*, Vol. 21, No. 2, pp. 152-174.

Intergovernmental Panel on Climate Change (IPCC) (2021) *Climate change 2021 – The physical science basis, Summary for policymakers*, IPCC Switzerland, [online] Available at <https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM_final.pdf>, [Accessed April 13, 2022].
Kassel, K. and Rimanoczy, I. (2016) Developing a sustainability mindset in management education, Routledge, New York.
Klingenberg, B. and Kochanowski, S. (2015) Hiring for the green economy: Employer perspective on sustainability in the business curriculum, *Journal of Management Development,* Vol. 34, No. 8, pp. 987-1003.
Klingenberg, B., Rider, C., Rothberg, H. and Sloan K. (2020) Knowledge management processes and organizational change towards sustainability: a case study, *Proceedings of the 21st European Conference on Knowledge Management (ECKM)*, Academic Conferences International, UK.
Klingenberg, B. and Rothberg, H. (2020) The status quo of knowledge management and sustainability knowledge, *Electronic Journal of Knowledge Management,* Vol. 18, No. 2, pp. 136-148.
Klingenberg, B., Rider, C. and Sloan, K. (2021) A definition for sustainability knowledge in SMEs: a systematic literature review, presented at: *Decision Sciences Institute 2021 Annual Conference*, virtual.
Lacy, P., Haines, A. and Hayward, R. (2012) Developing strategies and leaders to succeed in a new era of sustainability, *Journal of Management Development*, Vol. 31, No. 4, pp. 346-357.
Lueneburger, C. and Goleman, D. (2010) The change leadership sustainability demands, *MIT Sloan Management Review*, Summer, pp. 49-55.
Matos, F., Vairinhos, V., Dameri, R.P. and Durst, S. (2017) Increasing smart city competitiveness and sustainability through managing structural capital, *Journal of Intellectual Capital*, Vol. 18, No. 3, pp. 693-707.
Matos, F., Vairinhos, V., Selig, P.M. and Edvinsson, L. (2019) *Intellectual capital management as a driver of sustainability: perspectives of organizations and societies*, Springer, Berlin.
McGrath, M. (2021) Climate Change: IPCC report is ´code red' for humanity, *BBC*, [online] Available at https://www.bbc.com/news/science-environment-58130705, [Accessed April 15, 2022].
Meadows, D.H. (1999) *Leverage points: places to intervene in a system*. [online] Available at https://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/, [accessed April 15, 2022].
Meilnschmid, J., Foerstl, K. and Kirchoff, J.F. (2016) The role of absorptive and desorptive capacity (ACDC) in sustainable supply management – a longitudinal analysis, *International Journal of Physical Distribution & Logistics Management*, Vol. 46, No.2, pp.177-211.
Mohamed, M., Stankosky, M. and Mohamed, M. (2009) An empirical assessment of Knowledge Management criticality for Sustainable Development, *Journal of Knowledge Management*, Vol. 13, No. 5, pp. 271-286.
Mohamed, M., Murray, A. and Mohamed, M. (2010) The role of Information and Communication Technology (ITC) in mobilization of sustainable development knowledge: a quantitative evaluation, *Journal of Knowledge Management*, Vol. 14, No. 5, pp. 744-758.
Muff, K., Liechti, A. and Dyllick, T. (2020) How to apply responsible leadership theory in practice: a competency tool to collaborate on the sustainable development goals, Corporate Social Responsibility and Environmental Management, Vol. 27, No. 5, pp. 2254-2274.
Nonaka, I. and Takeuchi, H. (1995) *The knowledge-creating company: how Japanese companies create the dynamics of innovation,* Oxford University Press, New York.
Partelow, S. (2016) Coevolving Ostom's social-ecological systems (SES) framework and sustainability science: four key co-benefits, *Sustainability Science*, Vol. 11, 399-410
Polanyi, M. (1967) *The tacit dimension,* Doubleday, New York.
Rimanoczy, I. (2010) *Business leaders committing to and fostering sustainability initiatives,* ProQuest Dissertation Publishing.
Rimanoczy, I. (2021a) Anthropocene and the call for leaders with a different mindset, in: Ritz, A. and Rimanoczy, I. (eds), *Sustainability Mindset and Transformative Leadership: a multidisciplinary perspective*. Palgrave Macmillian, Cham.
Rimanoczy, I. (2021b) *The sustainability mindset principles: a guide to developing a mindset for a better world,* Routledge, London.
Rimanoczy, I. and Klingenberg, B. (2021) The Sustainability Mindset Indicator – a personal development tool, *Journal of Management for Global Sustainability*, Vol. 9, No. 1, pp. 43-79.
Rimanoczy, I. and Llamazares, A.M. (2021) Twelve principles to guide a long-term paradigm shift, *Journal of Management, Spirituality & Religion*, Vol. 18, No. 5, pp. 54-76.
Ritz (2021) Connective leadership and sustainable development, in: Ritz, A. and Rimanoczy, I. (eds), *Sustainability Mindset and Transformative Leadership: a multidisciplinary perspective*. Palgrave Macmillian, Cham.
Rokeach, M. (1973) *The nature of human values*, Free Press, New York.
Schneidewind U. (2010) An institutional reform agenda for the establishment of transdisciplinary sustainability research, *CAIA – Ecological Perspectives for Science and Society,* Vol. 19, No.2, 122-128.
Seiffert, M.E.B. and Loch, C. (2005) Systemic thinking in environmental management: support for sustainable development, *Journal of Cleaner Production*, Vol. 13, No. 12, pp. 1197-1202.
Sloan, K., Klingenberg, B. and Rider, C. (2013) Towards sustainability: examining the drivers and change process within SMEs, *Journal of Management and Sustainability*, Vol 3, No. 2, pp 19-30.
Snyman, R. & Kruger C.J. (2004) The interdependency between strategic management and strategic knowledge management, *Journal of Knowledge Management*, Vol. 8, No. 1, pp. 5-19.

Soyka, P.A. (2012) *Creating a sustainable organization – Approaches for enhancing corporate value through sustainability*, Pearson Education, Upper Saddle River.

Stenmark, D. (2001) Leveraging tacit organizational knowledge, *Journal of Management Information Systems*, Vol. 17, No. 3, pp. 9-24.

United Nations (2015) *Transforming our world: The 2030 agenda for sustainable development, A/RES/70/1,* [online] Available at < https://sustainabledevelopment.un.org/post2015/transformingourworld/publication> [Accessed 25 March, 2019].

United Nations (2021) *Sustainable development report 2021 – The decade of action for the Sustainable Development Goals*, Cambridge University Press, [online] Available at < https://www.cambridge.org/core/books/sustainable-development-report-2021/2843BDD9D08CDD80E6875016110EFDAE> [Accessed April 13, 20222].

Waddington, D.I. and Fennewald, T. (2018). Grim fate: learning about systems thinking in an in-depth climate change simulation, *Simulation & Gaming*, Vol. 49, No. 2, pp. 168-194.

Wigglesworth, C. (2014) *SQ21: the twenty-one skills of spiritual intelligence*, Select Books, New York.

Wilber, K. (2005) Introduction to integral theory and practice, *AQAL: Journal of integral Theory and Practice*, Vol. 1, No. 1, pp. 2-28.

Williams, A., Kennedy, S., Philipp, F., and Whiteman, G. (2017) Systems thinking: a review of sustainability management research, *Journal of Cleaner Production*, Vol. 148, pp. 866-81.

Wilson, I.E. and Rezgui, Y. (2013) Barriers to construction industry stakeholders' engagement with sustainability. Toward a shared knowledge experience, *Technological & Economic Development of Economy*, Vol. 19, No. 2, pp. 289-309.