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Knowledge Management and Its Role in Strategic Sustainability Management in the Finance Sector

Timothy Donnelly and Mark Wickham

Abstract

Given the broad economic, environmental, and social challenges in the modern competitive environment, it is not surprising that effective sustainability management has emerged as an important variable in the strategic management process. Increasingly, firms are finding it necessary and beneficial to build sustainability principles into their strategic planning, and the extant research has shown that effective strategic management of sustainability can have a variety of positive outcomes for the firm such as improved economic. Given its demonstrable importance to the strategic management process, and the noted absence of a knowledge management process in the literature, this chapter seeks to address the broad research opportunity to explore what elements comprise a sustainability knowledge management system.

Keywords: knowledge management, sustainability, finance sector

1. Introduction

Given the broad economic, environmental, and social challenges in the modern competitive environment, it is not surprising that effective sustainability management has emerged as an important variable in the strategic management process [1, 2]. Increasingly, firms are finding it necessary and beneficial to build sustainability principles into their strategic planning, and the extant research has shown that effective strategic management of sustainability can have a variety of positive outcomes for the firm such as improved economic [3, 4], improved human resource factors [5, 6], and reputational benefits [7, 8]. Historically, strategic sustainability management has had an 'outputs' focus [9, 10], such as, the focus on reporting sustainability outcomes fundamental to the triple-bottom line (TBL) framework. However, scholars have recently noted the shortcomings of the TBL (and similar) frameworks that emphasise the outputs of sustainability management rather than the antecedent resources and capabilities [11]. Recently, there has been a push to reassess the research approach to researching effective sustainability management processes by refocusing on the application and nature of strategic inputs [12]. Over the past 30 years, the focus on strategic antecedents has been evident in other disciplines (e.g., human resource management, accounting and finance, and marketing) that have been elevated to operate as integral aspects of the strategic management process.

The most popular theoretical strategic management lens for the exploration of strategic inputs is the resource-based view of the firm (RBV) [13, 14]. As RBV literature developed, scholars increasingly focussed on the nature of intangible assets, as research showed that it was these assets that were the most integral to establishing a sustainable competitive advantage [15]. One such asset that has received increasing attention is the knowledge capabilities that exist within a firm, and how that knowledge can be accessed and applied to strategic decision making [16]. This has led to the establishment of the knowledge management (KM) field of strategic management research, an extension of the RBV focussing exclusively on the application and nature of knowledge in a competitive context [17, 18]. The concept of knowledge management (KM) has become the key theoretical framework through which knowledge is examined and researched [19, 20].

Insofar as there has been research seeking to align principles of KM and sustainability, these have been retrospective in nature rather than deliberate and systematic [21]. Frameworks such as those by [22] have sought to improve the sustainability of the KMs themselves. Whilst this is a valuable pursuit that has the potential to benefit firm processes, it does not offer solutions to the effective management of sustainability. Other frameworks, such as, the one devised by [23] sought to reconfigure sustainability at the conceptual level so as to fit it into extant finance/HRM/marketing KM structures. These have ultimately been proven to be insufficient for the challenges facing modern firms operating in today's competitive landscape [21, 24]. There is a notable absence in the literature of a KM that actually provides insight into the effective strategic management of sustainability [24]. Given its demonstrable importance to the strategic management process, and the noted absence of a knowledge management process dedicated to the sustainability concept, this chapter seeks to address the broad research opportunity to explore what elements comprise a sustainability knowledge management system.

2. Literature review

2.1 Knowledge management

The inclusion of 'knowledge management' as an organisational concept has been attributed to the McKinsey consulting firm in 1987 when they implemented a motion study of their information handling and utilisation processes [25]. For the purposes of this chapter, KM is defined as the systematic approach to the management of information and knowledge within a firm, including the identification, acquisition, storage, sharing, conversion, and application of knowledge for firm processes [26]. KM as an organisational process, therefore, seeks to facilitate the collection, application and development of firm knowledge to establish and sustain competitive advantage across three specific dimensions: (a) the strategic dimension—i.e., related to the strategic importance of knowledge and its management, (b) the managerial dimension—i.e., related to firm knowledge assessment and management, and (c) the operational dimension—i.e., related to the development and usage of knowledge and intellectual asset. The effective management of KM requires the firm to invest in knowledge management infrastructure—the key elements of this infrastructure will be discussed in the next section.

2.2 Knowledge management infrastructure

For knowledge to be used to effectively and efficiently improve the strategic capabilities of a firm, it must possess an appropriate infrastructure (both

technologically and organisationally) to support the acquisition, conversion, and application of relevant knowledge [27–29]. Gold et al. [30] and later, [28], identified a series of fundamental elements of KM infrastructure: technology, organisational culture, knowledge acquisition, knowledge conversion, and knowledge application.

2.2.1 Technology

In the early 2000s, researchers tended to emphasise the benefits of IT above all other organisational infrastructure assets in the knowledge management process [31]. Today, it is widely accepted that effective IT systems play a key role in contributing to organisational processes. However, research indicates that effective IT systems need to be adequately integrated with structural and cultural elements in order to substantively contribute to KM [30, 28]. When effectively implemented and integrated, technology-based assets and IT can contribute to more advanced knowledge creation, sharing, distribution and application [30, 28]. For example, KM systems relating to all of the discipline areas noted above are supported by wide array of advanced software packages (e.g., Zendesk, ProProfs KnowledgeBase, Atlassian Confluence, Bitrix24, etc.), and it is now considered a necessity for firms to invest in technology-based KM processes in order to remain competitive and responsive in dynamic market conditions [32, 33].

2.2.2 Organisational culture

Given the increasing importance of knowledge management processes to strategic performance, a majority of firms make efforts to integrate knowledge-sharing into their organisational culture [29]. The inclusion of knowledge-sharing as a corporate value and organisational norm allows organisations to quickly react to the changing competitive landscape, ensuring that employees and management will either possess the knowledge required or the ability to quickly acquire the knowledge required, to adapt to new competitive challenges [19]. One major influence on a firm's knowledge sharing willingness is the issue of reciprocity [29], that is, the perception that they will receive a valuable return because of the knowledge they choose to share with others (e.g., direct compensation of some kind; enhanced reputation, being given an employee award, etc.). In this way, the elements of an organisation's culture (i.e., stories, rituals, language, values, etc.) can operate as powerful mechanisms in the knowledge management process [28, 34].

2.2.3 Knowledge acquisition

Knowledge acquisition refers to the process of understanding the need for knowledge, identifying the source of information, and undertaking the steps needed to collect it effectively and efficiently [28, 35]. This aspect of KM can be done by '... seeking, generating, creating, capturing, and collaborating on knowledge' by individuals who observe, experience, imitate, practice, or otherwise interact with others [28], p. 317. These activities can be conducted externally to the firm in order to acquire knowledge from a wide variety of stakeholders (e.g., customers, competitors, suppliers, regulators, etc.) or conducted internally from analysis of the organisation's past experiences or mistakes [28]. Internal knowledge is sometimes considered 'tacit' in that it exists within the firm but is possessed by one individual (or a close group of people) and is not readily accessible to others [28, 35].

2.2.4 Knowledge conversion

Knowledge conversion refers to the process by which knowledge (at this point already acquired, stored and shared) is made useful to the firm by the conversion of tacit knowledge to explicit knowledge (i.e., available for those who need it or can use it more effectively) [30]. Cho and Korte [28] note that in small firms, this knowledge conversion often happens through casual dialogue and exchange, and [36] demonstrates that often in this process new knowledge or innovative capacity is generated. Cho and Korte [28] emphasise that the need for knowledge conversion to be conducted systematically and deliberately in large firms due to the inherent complexity in that context. Technological support is required for the management of knowledge in these more complex contexts, through the use of information databases, document management systems, and instant messenger communication channels [28].

2.2.5 Knowledge application

Knowledge application refers to the process whereby the knowledge generated by the KM system is developed to a point where it is fit for use in decision-making and task performance within the firm [37]. This process requires management to define and codify the decision-making and task performance routines within their firm to standardise the mechanisms by which the quality of the knowledge is verified as being fit for purpose (e.g., managerial review processes, cross-checking implications, peer-review of data, etc.), and the manner in which it informs task performance (e.g., training manuals, key performance indicators, performance management systems, etc.).

2.3 Specific research question

Given the discussion above, the specific research question to be addressed in this chapter is: *What comprises best-practice knowledge management systems for the acquisition, conversion, and application of sustainability information in a strategic context?*

3. Method

3.1 Sustainability knowledge management and the case of the international finance sector

For the purposes of this research, the industrial context chosen to explore best-practice sustainability knowledge management was the international finance sector (and credit providers in particular). Recently, researchers have noted that the engagement with strategic sustainability practices has become increasingly important for credit providers in this industry, particularly in response to the poor reputation of the sector and the increased political and regulatory scrutiny that has been placed on it post-global financial crisis (GFC) [38, 39]. Events including the industry sector's response to the GFC, the U.S. governments bailout of the banks (i.e., the *Emergency Economic Stabilization Act 2008*) and the 2017/18 Australian Royal Commission provide a unique industrial and societal context where the effective use of strategic sustainability processes and social accountability is seen as increasingly important to restore public trust [40, 41].

3.2 Qualitative content analysis

In order to address the specific research question, this research adopted a qualitative content analysis research design following the protocols recommended by [42–44]. Content analysis was deemed appropriate for this research area as it provides a flexible method by which to explore complex phenomena and enables researchers to move freely between stages of analysis, allowing for a thorough thematic analysis [45]. The content analysis process in this research comprised of three stages.

3.2.1 Stage one: data selection and acquisition

In stage one, appropriate data was selected and acquired. Firstly, it needed to be considered what sample of firms could represent best-practice performance in sustainability and engage in effective KMPs. To this end, the annual reports of nine firms (see **Table 1**) were gathered and analysed. All firms operated in the finance industry as credit providers and were B-Corporation (B-Corp) certified. Firms in the credit providing industry were chosen due to the inherent importance of knowledge and information in effectively competing in the industry [46]. B-Corp certification status is awarded by the U.S. non-profit ‘B-Lab’ organisation and certifies best-practice performance against a range of social and environmental performance, public transparency, and legal accountability standards (B-Corporation Website 2019). Annual reports were collected as they represent the main corporate communication tool used by firms [47] and are accepted as a reliable and valid source of strategic information [48, 49]. All annual reports were downloaded in PDF format directly from the firms’ official websites.

3.2.2 Stage two: extracting sustainability data

In stage two, coding rules relating to the three pillars of sustainability (i.e., economic, environmental, and social) were developed using the global reporting initiative (GRI) G4 reporting criteria as a guide [50]. The GRI is an international independent non-profit organisation founded in 1997 in association with the United Nations that has published a comprehensive set of economic, environmental and social sustainability performance standards considered globally to be the basis for best-practice sustainability reporting [51]. Due to its function as a leading

Firm name	Type	Location	Certified
Beyond Bank Australia	Banking and financial services	Australia	2015
Charity Bank	Banking and financial services	United Kingdom	2014
City First Bank	Banking and financial services	United States	2017
Kindred Credit Union	Credit union	Canada	2016
Mascoma Bank	Banking and financial services	United States	2017
O-Bank	Banking and financial services	Taiwan	2017
Silver Chef	Hospitality equipment funding	Australia	2015
Sunrise Banks	Banking and financial services	United States	2009
Triodos Bank	Banking and financial services	Netherlands	2015

Table 1.
Summary of sample firms.

KM variables		Coding rule
Knowledge infrastructure capability	Technology	This node captures data relating to technology infrastructure such as IT, search and retrieval engines, KM databases, and learning technologies
	Culture	This node captures data relating to organisational culture such as knowledge sharing, interaction, vision and mission, and participation
Knowledge process capability	Acquisition	This node captures data relating to any knowledge acquisition from suppliers, customers, competitors and others
	Conversion	This node captures data relating to the storage, transforming, and transportation of knowledge
	Application	This node captures data relating to the actual application of knowledge within the firm

Table 2.
Knowledge management variables and coding rules.

international benchmark, the GRI has served as the basis for content analysis coding firm sustainability strategies and activities in a range of academic research disciplines [52–54]. All annual report data gathered in Stage One were entered into a codified database using the GRI definitions. Coding refers to the process of converting data into a contextual value for the purposes of storage and thematic analysis [54]. The coding was facilitated using the NVIVO (version 12) software package, which is a computer-aided qualitative data analysis tool that researchers use to organise data and conduct thematic analysis. The data were coded in a ‘line-by-line’ manner according to the process prescribed by [55].

3.2.3 Stage three: applying a knowledge management lens

In stage three, coding rules for detecting data relevant to KM were developed (see **Table 2**) by adapting the operational definitions of KM elements provided by [28], p. 319 that were described in the literature review section. The data were then entered into a codified database using the same techniques as described above for stage two. The data emanating from stage three of this content analysis process for the basis of the findings that follow.

4. Findings

4.1 Technology

In terms of the technology element of a sustainability-focused KM system, the data indicated that the sample firms made use of their technological infrastructure for two main sustainability purposes: (a) to enhance their economic processes through iterative technological improvement, and (b) to share information technology knowledge with stakeholders (most notably disadvantaged segments of the population) through technological and financial literacy education. In terms of enhancing their economic processes through technological improvement, the sample firms demonstrated an ongoing investment in IT as well as technological training for employees.

This level of profitability was in line with forecast and was achieved on the back of the strong growth, low interest margins and the Board’s decision to continue to

invest in the business strategy, particularly Information Technology and our People (Beyond Bank Australia).

Furthermore, we are continuing to implement an electronic approval system for official document, and promote the frequent use of e-forms and e-mail, and have installed bank-wide videoconferencing equipment in order to reduce the use of paper (O-Bank).

In terms of sharing information technology knowledge with stakeholders, the sample firms demonstrated a willingness to engage with customers in order to improve financial and technological literacy, simultaneously contributing to both economic and social sustainability agendas:

At these events, the Bank engages with customers by making them financially aware about Banking products and services, technology-based products, teach them how to use ATMs, mobile banking and internet banking, online account opening, remittance services, etc., (Sunrise Banks).

To accommodate the Bank's recent shifting towards digital banking, we also invited outside experts to give talks or offer training and asked in-house experts to devise online courses so that employees could strengthen their expertise in financial technology and related issues. In addition, we actively work with a number of universities to develop training programs in an effort to seek out even more promising financial innovation professionals (O-Bank).

The data demonstrated that in terms of the technology element of a sustainability-oriented KM system, technological infrastructure underpinned and enabled a wide variety of sustainability and KM processes within the firms. In their key lending and finance driven operations (i.e., economic sustainability), technological infrastructure facilitated communication, project management, reputation management, market/targeted research, and most other aspects of managing a credit provider in the modern complex financial landscape. In non-economic sustainability areas, technology contributed primarily to the education of customers and potential customers regarding 'digital banking' and overall financial and technological capability. This has the dual benefits of providing a desirable social outcome, whilst simultaneously building the firms' potential customer base.

4.2 Organisational culture

In terms of the organisational culture element of a sustainability-focused KM system, the data indicated that the sample firms communicated knowledge-based sustainability principles to their salient stakeholders through (a) their mission/vision statements, and (b) their dedicated sustainability reporting documents. In terms of their mission and vision statements, the sample firms consistently communicated their sustainability values and priorities (i.e., language) of sustainability to their stakeholder groups:

To make real the vision of sustainable development, the bank commits itself to the following five key areas: corporate governance, employee care, customer relations, social engagement, and environmental protection (O-Bank).

Since 2002, Charity Bank's innovative approach to lending and its mission to benefit society have enabled it to lend over £200 million worth of loans to hundreds of social sector organisations across the UK (Charity Bank).

The NMTC program has proven to be an effective tool, helping us achieve our mission of supporting community development and stimulating economic growth in low-income communities across our region. We are pleased the CDFI is supportive of our efforts (Mascoma Bank).

In terms of their dedicated sustainability reporting documents, the sample firms emphasised their sustainability ‘success stories’ in much greater detail for consumption by their stakeholder groups:

For Triodos Bank integrating reporting does not just mean reporting on how the organisation behaves as a responsible corporate citizen—by using renewable energy to power its buildings, for example, important as this is. It means reporting in-depth on the impact of its activity in the widest sense, through the impact of its loans and investments in particular. A growing number of integrated reports suggests more businesses consider their impact on society and the environment as core to their activities (Triodos Bank).

Beyond Bank Australia cares about the community and is committed to environmental sustainability. This annual report has been printed on Monza Recycled, manufactured by an ISO 14001 certified mill, and contains 99% recycled fibre and elemental chlorine free pulp. All virgin pulp is derived from well-managed forests and controlled sources (Beyond Bank).

The data demonstrated that in terms of the organisational culture element of a sustainability-oriented KM system, the sample firms utilised their culture-fostering capabilities to orient their (sometimes ‘broad’ and ‘flat’) organisational structures towards sustainability projects when feasible. Mission and vision and statements often referenced non-economic benefits such as community development, cultural preservation, and environmental conversation. With their dedicated sustainability reporting documents, firms took an active approach to managing their reputation among those external stakeholders and supply-chain partners that consume such content, branding themselves as actors for positive change and focussing on whichever particular aspect of sustainability was most appropriate for that market or industrial sector.

4.3 Acquisition

In terms of the acquisition aspect of a sustainability-focused KM system, the data indicated that the sample firms acquired sustainability knowledge through two main activities: (a) exchange with stakeholders (i.e., strategic partners, investors, industrial alliances, and benchmarking organisations), and (b) targeted talent acquisition, particularly sustainability experts either from the academic or professional sphere. In terms of exchange with stakeholders, the sample firms demonstrated the capability to gather economic, environmental and social information and knowledge from partners and potential partners with greater expertise in their given field. By maintaining this exchange (beyond the initial investigation for investment purposes), the sample firms ensured that they always possessed the most up-to-date sustainability information:

Today, citizen energy makes the ‘business case’ for investing in clean energy technology. The DC based consulting firm helps communities join the clean energy economy through the simplest energy efficiency upgrades, like solar power and LED lighting. The company provides integrated energy auditing, financing, value engineering,

technology procurement, project management, installation, and ongoing performance management. Citizen Energy has helped building owners improve building efficiency, add value to their buildings and cut their carbon footprint by at least 30% (City First Bank).

In keeping with its commitment to corporate social responsibility, the Bank maintains a spirit of service that values learning, innovation, and sustainability. Setting up an education foundation as early as July 2000, we draw on our corporate expertise, government support, and private resources to vigorously promote various industry-academia collaborations, technology management seminars, entrepreneurship workshops, and art and cultural activities (O-Bank).

In terms of targeted talent acquisition, the sample firms demonstrated the capability to identify and attract experts that could provide valuable assistance in assessing the sustainability potential of potential strategic partnerships, as well as guide the firms' own internal sustainability activities:

[The Bank hopes to] become more relevant in the major shifts in energy production by financing larger projects. In parallel, we will want to use our expertise to finance smaller energy projects which contribute to a distributed energy system including efficiency, and energy storage (Triodos Bank).

This model creates value by transforming capital inputs. These inputs include the skills and entrepreneurship of the people within our organisation and money from customers, via our core products and services. It transforms these inputs into value outputs so that they make a positive contribution to the development of a healthy society that is able to flourish within our planetary limits (Triodos Bank).

The data demonstrated that in terms of the acquisition element of a sustainability-oriented KM system, the sample firms demonstrated the ability to both 'cast a wide net' in assessing the sustainability agendas suitable for a sustainable return on investment, and the ability to 'focus in' on the specific research, technology, processes, or strategies required to target investment effectively. The firms did not appear to rely on secondary data in this regard and often engaged in productive dialogue with a wide variety of supply-chain and environmental actors, seeking to acquire a well-rounded perspective on whichever sustainability agenda they were either considering investing in, or in which they had an ongoing financial stake. These activities benefitted from the acquisition of appropriate sustainability and finance experts that were effectively integrated into existing structures and, indeed, often given a great deal of autonomy in deciding how to best contribute to a (usually environmental or social) sustainability agenda.

4.4 Conversion

In terms of the conversion aspect of sustainability-focused KM system, the data indicated that sustainability knowledge is stored within specialised teams within the sample firms. This is particularly evident in the management of environmental sustainability information and operations regarding the renewable energy sector:

LEAF lab (local economy alternative finance) is a dedicated innovation team working for Triodos Bank in the Netherlands. Its experiments in 2017 included 'Participating with Passion,' an initiative to connect sustainable start-ups with Triodos' private banking customers. The first private banking client invested in a

sustainable start-up during the year. The group also continued to develop finance for decentralised local renewable energy cooperatives. It is also co-developed a circular currency initiative, United Economy, during the year enabling sustainable entrepreneurs to trade with each other with sustainable money, or Uniteds (Triodos Bank).

The sample firms also demonstrated an ability to communicate their sustainability knowledge to partners further down the supply-chain, in order to contribute to the achievement of broad sustainability goals such as economic strength, environmental preservation and self-efficacy for socially disadvantaged groups:

We provided vigorous support for schools and daily assistance in remote areas: offering scholarships to outstanding young students, joining schoolchildren in celebrating the holidays, conducting financial knowledge instruction, and collecting second-hand books for donation to schools in remote areas (O-Bank).

The bank provides knowledge on basic accounting and tax policy for existing and prospective SME clients to enable them to cope with, and comply with government policies so that they can sustain and run their business smoothly (Sunrise Banks).

The data demonstrated that in terms of the conversion aspect of a sustainability-focused KM system, the sample firms had already acquired a sufficiently sized knowledge-base that they were able to establish and operate specialised teams dedicated to various aspects of sustainable research and operations (i.e., financial investment). The most widely reported of these was teams specialising in investment in the renewable energy sector. Almost all of the sample firms reported the existence of some kind of specialised renewable energy sector team, or demonstrated a sophisticated level of renewable energy sector knowledge. In addition to this specialised and structured knowledge-base, firms demonstrated the capability to communicate both broad and specific sustainability principles, processes and information to their supply-chain partners, most notably to sources of financial capital and firms with whom they possessed a financial stake.

4.5 Application

In terms of the application aspect of sustainability-focused KM system, the data indicated that all of the sample firms applied sustainability knowledge in across of their functional operations. In terms of economic sustainability, knowledge was utilised to maximise return on investment, attract investor capital, and effectively manage ongoing projects:

Triodos Bank puts sustainable banking into practice. First and foremost, this means offering products and services that directly promote sustainability (Triodos Bank).

This model creates value by transforming capital inputs. These inputs include the skills and entrepreneurship of the people within our organisation and money from customers, via our core products and services. It transforms these inputs into value outputs so that they make a positive contribution to the development of a healthy society that is able to flourish within our planetary limits (Triodos Bank).

Become more relevant in the major shifts in energy production by financing larger projects. In parallel, we will want to use our expertise to finance smaller energy

projects which contribute to a distributed energy system including efficiency, and energy storage (Triodos Bank).

In terms of environmental sustainability, knowledge was utilised to identify, finance and assist strategic partners in working towards the achievement of environmental conservation agendas, most notably in renewable energy markets:

Triodos Bank and its investment funds, offered via Triodos investment management, finance and cofinance enterprises that augment the use of renewable resources in particular and supports projects that reduce the demand for energy and promote energy efficiency. Triodos Bank describes and independently verifies the contribution it makes to the avoided carbon emissions that result from these energy projects. We are transparent about this approach in the annual report because we think it is important that our stakeholders understand the approach we take to these disclosures (Triodos Bank).

The DC based consulting firm helps communities join the clean energy economy through the simplest energy efficiency upgrades, like solar power and LED lighting. The company provides integrated energy auditing, financing, value engineering, technology procurement, project management, installation, and ongoing performance management. Citizen energy has helped building owners improve building efficiency, add value to their buildings and cut their carbon footprint by at least 30% (City First Bank).

The Bank's purchasing prioritizes and emphasizes environmental protection and suppliers that comply with green energy requirements, and we strive to engage in green purchasing (O-Bank).

In terms of social sustainability, knowledge was utilised to target investment towards organisations (charities, social enterprises, and philanthropic foundations) focussed on social sustainability goals:

With its sponsorship of art events meant for charity, innovative startups, and social engagement events, our Education Foundation was a recipient of the Arts & Business Awards of the Council for Cultural Affairs in 2010 and of the 9th National Civic Service Awards of the Ministry of the Interior in 2011. These honours attest to the Bank's dedication to fulfilling its corporate social responsibility (O-Bank).

We are the financial partner for social organisations delivering services for people struggling to meet their nutritional requirements, in Europe. We finance Biosabor, in Spain, an organic agricultural company that produces 300 hectares of vegetables and fruit in a sustainable way. Good quality food surpluses are distributed to disadvantaged people (Triodos Bank).

The data demonstrated that in terms of the application aspect of a sustainability-focused KM system, the sample firms demonstrated the capacity to apply their sustainability knowledge in a wide array of contexts. In an economic sustainability context, the firms demonstrated the capability to leverage their reputation in financial markets as 'sustainable' to attract suitable financial investors, maximise return on investment, and effectively manage short and long-term projects, enabling them to offer more to supply-chain partners than just financial capital. In

an environmental context, the firms demonstrated the capability to interact with environmental preservation and conservation agendas in a sophisticated manner. All of the sample firms targeted investments in the environmental sector, most commonly renewable energy but also agendas such as sustainable agriculture and flora and fauna preservation. Given the economic obligations of the firms, environmental investments were selected that could also provide a competitive return on investment margin. In a social sustainability context, financial resources were directed towards organisations that offered to contribute to the ongoing wellbeing of societal units, most often at the community level. Such investments were often integrated with economic and environmental sustainability goals.

5. Discussion

5.1 Insights

The findings in this research provide three valuable insights for sustainability and knowledge management scholars and practitioners. Firstly, there is the apparent effectiveness of engaging in deliberate and deep stakeholder relationship management. Secondly, there is the manner in which the sample firms' top-management emphasise sustainability knowledge principles through their organisational culture-fostering activities. Lastly, there is the way in which firms applied their sustainability knowledge in almost all of their operations. Each of these insights are discussed in detail below.

5.1.1 Stakeholder engagement

The thematic analysis of the data in this research indicated that all the sample firms utilised deep stakeholder engagement to support, gather, apply, and make sense of the complex concepts and information required to contribute to and/or achieve broad sustainability agendas. This was particularly evident in regard to the acquisition aspect of KM systems; firms gathered information from financial investors, organisations in which they had an ongoing financial stake (or were considering investing in), strategic alliances with both competitors and non-competitors that were contributing to intersecting sustainability agendas, and secondary data from academic and benchmarking institutions. In addition to acquiring data from stakeholders, firms utilised stakeholder engagement in order to most efficiently apply their sustainability knowledge (i.e., firms used their relationships to apply their capital and sustainability knowledge *strategically*), maximising economic, environmental and social outcomes.

5.1.2 Sustainability culture

Analysis of the data indicates that the top-management of the sample firms consistently emphasised relevant sustainability principles throughout all of their culture-fostering activities. Beyond this, top-management also tended to include words and phrases related to knowledge management in organisational vision and mission statements and reporting documents. Words such as 'sharing' and 'learning' relate specifically to the conversion aspect of KM systems and were often paired with relevant sustainability concepts such as environment preservation and community development. The inclusion of these concepts at the top of level of the sample firms had a marked effect on the type of organisations the sample firms

were seeking to invest in (which is consistent with previous organisational culture research demonstrating the effect of top-management cultural guidance [34]).

5.1.3 Widespread application

Perhaps the most interesting insight to be derived from this research is the widespread and deliberate application of sustainability knowledge the firms demonstrated in a wide array of operations. The application of sustainability knowledge was evident in internal human resources management, operational decision-making (i.e., investment decisions), supply-chain management, reputation management, marketing, and strategic planning. In all of these areas, the firms consistently applied sustainability knowledge in order to maximise the effectiveness and efficiency of both their own financial interests as well as of contributions to sustainability agendas. The interrelationships between economic, environmental and social agendas provided rich ground for the development of investment strategies that aimed to achieve both organisational and societal goals. These investment strategies, in turn, provided valuable reputational capital with which to form differentiated market positions, and attract appropriate strategic partnerships. In managing supply-chain relationships, firms could use this sense of ‘common purpose,’ as well as traditional self-interest, to more closely align themselves with their stakeholders.

5.2 Model of a sustainability-oriented KM system

Figure 1 demonstrates the theoretical relationships inferred by the findings of this research. Sustainability principles informed the activities of the entire organisation, with technology and knowledge infrastructure providing the framework within which the firms sustainability operations could function. The principles and infrastructure then supported and enabled the acquisition, conversion, and

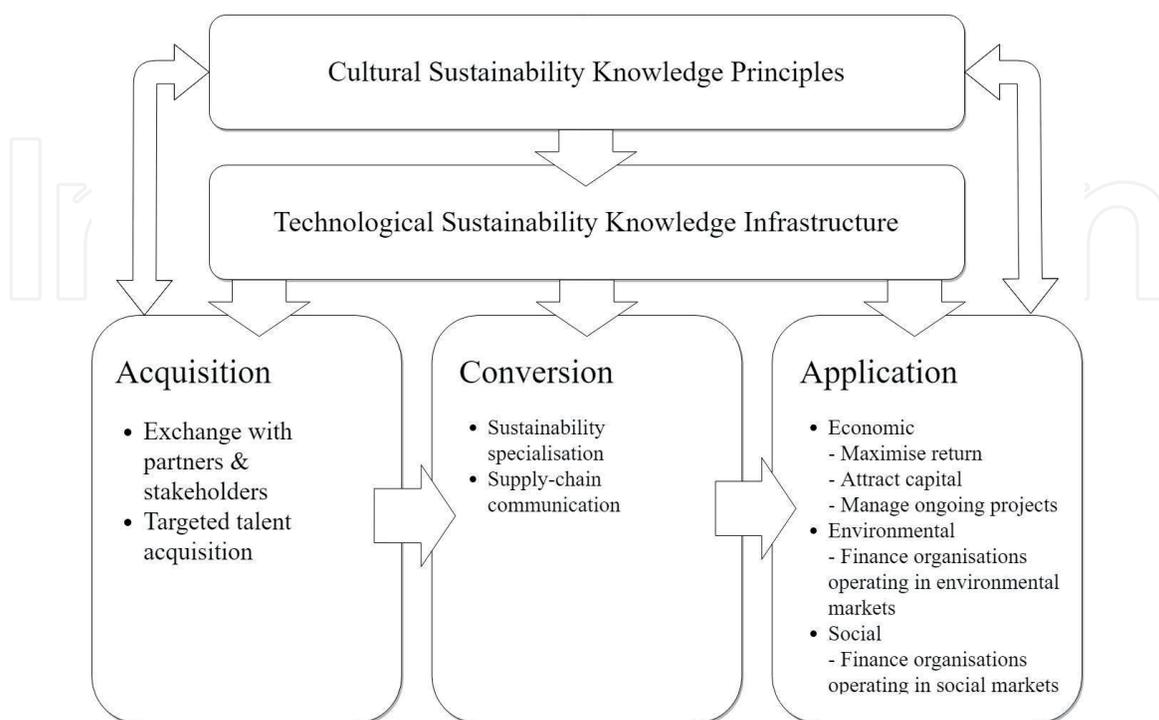


Figure 1.
Theoretical sustainability-oriented knowledge management system.

application of sustainability knowledge. Two feedback loops were formed between the acquisition and application functions, and the sustainability principles being cultivated through the sample firms' organisational culture. Over time, these loops are likely to reinforce the effectiveness of the KM system, building a solid base of knowledge that further informs strategic decision-making.

6. Conclusion

6.1 Limitations

The findings and theoretical and practical implications presented in this chapter need to be considered in terms of the limitations inherent to the adopted research design. There are three limitations the need to be considered. Firstly, the qualitative research design adopted in this research means that the findings and implications cannot be readily generalised to other firms in the finance industry or to other industries. Secondly, the data gathered for this research were from the sample firms' annual report documents only, and the data contained in the array of other official communications (e.g., sustainability reports, integrated reports, public relation announcements, website content, etc.) was not considered for this research. Thirdly, the data gathered for this research was from a limited (but exhaustive) sample of nine B-Corp certified firms from a single industry setting whose annual report documents were published in English. This limitation means that the sustainability-focussed KM systems of firms that publish their annual report documents in other languages are not represented in this research.

6.2 Future research opportunities

Given the findings and limitations of this research, seven avenues of future search into sustainability-oriented KM system are apparent. In terms of the insights into the effective management of sustainability knowledge described in the previous section, three avenues of future research appear promising. Firstly, future research should explore the stakeholder management techniques with which firms of this type engage so thoroughly with their supply-chain and strategic partners. Secondly, future research should seek a finer-grained understanding of the organisational culture-fostering activities that the firms' top-management engaged in so as to widely spread sustainability knowledge and principles throughout their organisation. Thirdly, future research should seek to explore the specific ways in which sustainability knowledge can be applied to all aspects of modern business, as it appears that the sample firms in this sample utilised such knowledge in every aspect of their operation. In terms of the limitations of this research, four avenues of future research into sustainability-oriented KM systems are apparent. Firstly, and in order to capture a wider array of sustainability data than that published in a firm's annual report document alone, future search should seek to gather and analyse secondly data from a wider range of firm publications (e.g., sustainability reports, integrated reports, public relation announcements, website content, etc.). This will increase the quantity, quality and timeliness of firm data in this regard, and provide the basis for more detailed analysis of firms' sustainability-oriented KM systems. Secondly, and in order to generate a finer-grained understanding of the elements that make up a sustainability-oriented KM system, the collection and analysis of primary data is warranted. Primary data gathered from a range of key firm informants (e.g., senior executives, CEOs, etc.) would be particularly useful for verifying and expanding on the findings presented in this research. Thirdly, the

use of longitudinal data in the adopted research design would provide insights into how the discussed KM system elements develop and change over time. Given the overall context of rapidly changing competitive environments, analysis of firms that have been effective in this regard over the long term would provide valuable insights into how firms are able to adapt these complex processes as required. Lastly, this research should be replicated in other industry settings in order to provide a finer-grained understanding of how the discussed concepts and elements change and adapt to different competitive challenges.

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