

# THE KEY CHALLENGES ASSOCIATED WITH MAPPING SUSTAINABILITY-RELATED KNOWLEDGE FOR ORGANISATIONAL COMPETITIVENESS: AN EMPIRICAL STUDY

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## ABSTRACT

Although featuring strongly in the professional and practitioner press, the very concept of sustainability is elusive for businesses. For businesses, the creation of economic value by integrating corporate social and environmental responsibility issues now increasingly pose real profound strategic challenges. These complex challenges involve numerous processes carried out and influenced by many stakeholders to set the tone and guide corporate level decisions. As organisations try to meet these complex challenges, they need to be innovative. Decision makers often find it difficult to access core knowledge required in addressing highly complex and relatively new sustainability issues. This situation calls for mapping sustainability-related knowledge to increase the visibility of knowledge sources and hence facilitate and accelerate the process of locating relevant expertise or experience of stakeholders to improve decision processes.

This paper primarily reports on the empirical findings of an on-going research study, which is focused on managing change and knowledge associated with sustainability initiatives for organisational competitiveness. This paper focuses on what the key challenges organisations face in mapping sustainability-related knowledge en-route to organisational competitiveness. The findings are in the main, based on semi-structured interviews with fifty-nine professionals from forty UK organisations in four sectors – energy and utility, transportation, construction and not-for-profit organisations. It reviews the concept of sustainability and knowledge mapping. In addition, it presents the key challenges for mapping sustainability-related knowledge. The paper concludes that mapping sustainability-related knowledge is an integrated and complex process. The key challenges organisations facing in mapping sustainability-related knowledge are: mapping of dynamic knowledge, cross boundary knowledge mapping, knowledge representation, organisational culture and mapping tacit knowledge.

## KEY WORDS

Decision making, knowledge management, knowledge mapping, sustainability, tacit knowledge.

## INTRODUCTION

Reports in the academic, business and popular press make it clear that the world in which businesses operate today is different from the world of two to three decades ago. This is primarily due to: meeting increased demands and expectations of stakeholders; protecting degradation of natural resources; the knowledge economy; managing crisis and remediation while defending the organisation; and the diminishing social and community structures (Connor and Mackenzie-Smith, 2003). These complex issues involve numerous processes. They also influence by many stakeholders and further help to set the tone and guide corporate

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level decisions. Nevertheless, to businesses these are formidable environmental and social issues that have evolved over time and that must be addressed (Carroll and Buchholtz, 2006). To address the above issues and challenges, sustainability (or sustainable development) offers business leaders a 21st century management framework. Sustainability is a management principle that aims to create long-term shareholder value by seizing opportunities and managing risks related to the economic, environmental, and social impact of doing business (Savitz and Weber, 2006).

Increasingly, sustainability issues are becoming a part of what defines business success (The World Commission on Environment and Development, 2002). Although there is no definitive approach as to how companies can integrate sustainability issues into their overall organisational culture, it is clear that sustainability in organisations must be linked to the continual improvement of business performance (Coelho and Moy, 2003). However, existing management systems, it is argued, are not enough to improve corporate sustainability performance.

Many management scholars and consultants have argued that sustainability offers terrific opportunities for progressive organisations; and innovation is one of the primary means by which companies can achieve sustainable growth (Porter and Van Der Linde, 1995; Elkington, 1997; 2001; Hart, 1997; Hawken et al., 1999; Lovins et al., 1999). Managers who are able to perceive trends and weak signals where others see only noise or chaos can capitalise on the changing nature of the market to reposition their firms before new entrants become a serious threat. Today's corporations can seize the opportunity that sustainability offers (Hart and Milstein, 1999). Therefore, organisations need to know what their competitive advantage is and what capabilities they need to grow in order to maintain sustainable competitive advantage.

In contrast to conventional, market-driven innovation, sustainable development innovation must incorporate the added constraints of social and environmental pressures as well as consider future generations (Brundtland, 1987). Sustainable development innovation is therefore usually more complex (because there is typically a wider range of stakeholders) and more ambiguous (as many of the parties have contradictory demands). As organisations try to meet these challenges, knowledge is increasingly being seen as important for innovation and for producing knowledge intensive products and services desired by market so as to maintain competitive advantage. The management of knowledge is, therefore, increasingly considered an important source of sustainable competitive advantage (Hamel and Prahalad, 1994; Nonaka and Takeuchi, 1995).

At present it is not well understood how sustainability-related knowledge can be effectively brought together, managed and shared for effective decision making (Malone and Yohe, 2002). A major challenge facing most organisations is uncovering the most effective methods of mapping, capturing, sharing and applying new knowledge en route to economic value creation by integrating corporate environmental (e.g. climate change) and social (e.g. community engagement) sustainability issues into business. In particular, a mapping of knowledge between different users (e.g. community, employees, customers, suppliers and partners) with different perspectives and purposes (e.g. profit maximisation, minimising carbon emissions, reducing employees' workplace accidents and corporate philanthropy) is a key challenge.

Knowledge mapping is the field within knowledge management (KM) that aims to optimise the efficient and effective use of organisation's sustainability-related knowledge. As Skyrme and Amindon (1997) noted, most research attention has been given to KM within the organisation, and knowledge mapping remains an emergent research issue.

Speel et al. (1999) define knowledge mapping as the process, methods and tools for analysing knowledge areas in order to discover features or meaning and to visualise these in a comprehensive, transparent form, such that the business-relevant features are clearly highlighted. Knowledge maps are created by transferring certain aspects of knowledge into a graphical form that is easily understandable.

As Davenport and Prusak (1998) noted, developing knowledge map involves locating important knowledge within the organisation and then publishing some sort of list or picture that shows where to find it. Knowledge maps typically point to tacit as well as explicit knowledge. The principal purpose of mapping sustainability-related knowledge is to show people in an organisation or within a network where to go when they need sustainability-related expertise. However, as Renukappa and Egbu (2004) noted, knowledge mapping in a sustainability context is in its infancy and has the potential to address a number of challenges that organisations currently face with regard to sustainability.

Even though many authors argue that access to, and, effective use of knowledge is a critical element in shaping and managing change and in transitions toward sustainability there is little empirical research on what the key challenges organisations face in mapping sustainability-related knowledge en-route to organisational competitiveness, which is the aim of the research question posed by the authors of this paper. In the study reported here, four standard industry classification sectors are identified based on the environmental, social and economic account of the urban environment. The sectors considered for this study are energy and utility, transportation, construction, and not-for-profit organisations.

For the purpose of this research, knowledge mapping is defined as a process to determine the key value adding knowledge requirements of the organisation and its processes, its knowledge assets, and knowledge flows in order to fulfill organisational sustainability (environmental, social and economic) goals and objectives.

## RESEARCH AIM AND METHOD

This paper draws from an on-going doctoral study entitled “managing change and knowledge associated with sustainability initiatives for organisational competitiveness”. The aim of this research is to investigate how companies are managing change and knowledge associated with sustainability initiatives so as to improve their competitiveness. In order to achieve the aim and objectives of this research, a robust methodology is essential. Broadly, the research process is divided into three key phases. The three phases are the literature review, the pilot study and the main study. The development of the research work started with the literature review. The review of literature involved background study on change management, knowledge management and in varied areas of sustainability. This resulted in the development of a theoretical framework.

In this research study, prior to the main study, a pilot study was undertaken which helped with refining data collection plans with respect to both the contents of the data and the procedure to be followed. As Denzin et al. (1998) suggest, when there is a high degree of unpredictability, a pilot study is a good means to add value to the research. A pilot study allowed the researcher to focus on particular areas that may have been unclear previously (Yin, 1994). The initial time frame of the pilot study allows the researcher to develop and solidify a rapport with the participants as well as to establish effective communication.

This paper is based on the results from both the pilot (26 interviews from 17 organisations) and the main (33 interviews from 23 organisations) study. Therefore, a total of fifty-nine professionals from forty UK organisations across four industry sectors – energy and utility, transportation, construction and not-for-profit organisations were interviewed. The current study, which is reported in this paper, was interview-based and semi-structured in

format. Semi-structured interviews provide some flexibility and it is one of the ways to obtain a realistic picture of an individual's view (McCormack and Hill, 1997). Those who participated included board members, directors, advisers and managers responsible for corporate environmental, social and economic sustainability initiatives in organisations. The interviews lasted for between thirty and ninety minutes. The format of these interviews was face-to-face. All face-to-face interviews were recorded with permission and later transcribed.

As part of the analysis of the interviews, content analysis was employed. The content analysis began as a tool for quantitative researchers, now it is increasingly being used in qualitative studies (Silverman, 2004). Weber (1990) defined content analysis as "a research method that uses a set of procedures to make valid inferences from text". Using content analysis enabled the researcher to include large amounts of textual information and systematically identify its properties, e.g. the frequencies of most used keywords in context by detecting the more important structures of its communication content. This paper presents the results from both the pilot and main study on the key challenges organisations facing in mapping sustainability-related knowledge.

#### THE KEY CHALLENGES FOR MAPPING SUSTAINABILITY-RELATED KNOWLEDGE

Table 1 shows the key challenges for mapping sustainability-related knowledge as revealed in this study. From the data in Table 1, it is evident that the main challenges for mapping sustainability-related knowledge is the mapping of dynamic knowledge. This is followed by cross boundary knowledge mapping, knowledge representation, organisational culture, and tacit knowledge mapping.

Table 1: The key challenges for mapping sustainability-related knowledge as cited by interviewees

Key challenges for mapping sustainability-related knowledge	Percentage of interviewees cited (N= 59)
Mapping of dynamic knowledge	95%
Cross boundary knowledge mapping	92%
Knowledge representation	88%
Organisational culture	81%
Mapping tacit knowledge	73%

#### MAPPING OF DYNAMIC KNOWLEDGE

Knowledge mapping should start by deciding on the specific scope for and purpose of mapping knowledge, as well as the level of detail of the knowledge map (Soliman and Spooner, 2000). As Doppelt (2003) noted achieving sustainability means change for the industry, and that such a process of change depends on the ability of stakeholders and individual organisations to create and use new knowledge. Therefore, in creating graphical representation of an organisation's knowledge assets a major challenge becomes the handling of the dynamic aspect of the organisation's environment, as well as of the dynamic character of the knowledge base itself. As Shum (1998) stated, the mapping of organisational dynamics is a particularly difficult task. This is more so from a knowledge mapping standpoint, since some knowledge lose their value over time, other knowledge may be replaced with superior knowledge, and some knowledge may simply be forgotten. This calls for a dynamic and multi-functional approach to knowledge mapping.

In the current study, 56 interviewees out of 59 (95%) stated that mapping knowledge is difficult because of its dynamic character. The development of sustainability-related expertise databases (e.g. waste management experts list, stakeholders' management experts, energy management experts), is an early target for many large organisations. However, production and maintenance of expertise databases is not simple. A centrally managed database soon becomes out of date, if new employee joins or leaves the organisation.

Wexler (2001) suggests a number of generic knowledge mapping approaches that may be combined to capture such dynamism. These include competence maps, concept maps, strategy maps, causal maps, and cognitive maps. An important functionality of the knowledge map still is to enable the user to browse "knowledge holdings", both inside and outside of the organisational boundaries (Duffy, 2000). A dynamic, evolving map not only remains current, it keeps the valuable mapping process going (Seeman and Cohen, 1997).

#### CROSS BOUNDARY KNOWLEDGE MAPPING

Arguably no firm has ever been independent in knowledge terms, but it is certainly the case today that all organisations are increasingly dependent on external sources of knowledge to address sustainability issues. The complexity of sustainability and pace of change in government policies (e.g. climate change policy) makes it impossible even for the largest organisations to cover all potential developments and to grow knowledge capabilities across all potentially relevant sustainability areas. Although business interest in the concept of sustainability appears to be increasing world wide, there is considerable evidence in academic, professional and business literature that sustainability is an elusive concept (Barbier, 1989; Dixon and Fallon, 1989; Pearce et al., 1989; Gladwin et al., 1995; Zorvanyi, 1998). To address sustainability issues, knowledge is increasingly being accessed and shared across cultural and national boundaries as organisations and markets become international. Cross boundary knowledge transactions also apply to boundaries within organisations, between functional specialisms and between disciplines. Much new sustainability-related knowledge is created outside the organisation boundary, so organisations must develop absorptive capacity (Cohen and Levinthal, 1989): the capacity to access and assimilate new sustainability-related knowledge from external sources like customers, suppliers, government bodies, research institutes, and from voluntary organisations. Knowledge interdependence creates new management challenges resulting from the risks and difficulties of knowledge transactions across boundaries. So too, the development of new sustainable products or services increasingly requires the integration of knowledge from many disciplines (Pavitt, 1998). The ability to access and share sustainability-related knowledge across functional and disciplinary boundaries presents particular challenges since different communities and disciplines may have little common ground for shared understandings.

Results of the current study indicate that, executives generally believe that capturing and using external sustainability-related knowledge obtained from public research institutes, government bodies, suppliers and customers is critical in addressing sustainability issues. However, 54 interviewees out of 59 (92%) stated that mapping external knowledge is difficult. This is, in part, due to limited control over the behaviour of external sources like suppliers and customers. The lack of experience in mapping external knowledge, lack of techniques for mapping external knowledge, and lack of rewards are highlighted as some of the main concerns associated with mapping sustainability-related knowledge.

#### KNOWLEDGE REPRESENTATION

Capturing and representing knowledge that is in people and in organisations are the fundamental building blocks of knowledge mapping implementation (Kim et al., 2003). It is also noted that a significant and time consuming problem for knowledge-based system

developers is how to efficiently elicit knowledge from experts and transform this elicited knowledge into a machine usable format. A way of increasing the sensitivity of knowledge mapping is to pay attention to the different forms of relevant knowledge on a higher level of abstraction. A complete map should include both explicit and tacit knowledge within and across the organisation. Historically, the mapping of knowledge has mainly resulted from codification of various knowledge types. A key criticism of this approach is that valuable tacit knowing is lost in the process of codification and as a result the final map or representation is somewhat diluted (Swart and Powell, 2006).

In the current study, 52 interviewees out of 59 (88%) stated that representing critical sustainability related knowledge is difficult. For example, mapping of employees' skills, work processes and interdependencies may not adequately express the true nature of their expertise and co-ordination of the work. If the representation is too incomplete, then the purpose of knowledge map is meaningless.

Miscommunication in maps is hastened when the map-makers and map-users do not share the same language, or do not see eye to eye on what are the goals at the centre of the knowledge map. Knowledge maps are abstract. They capture representations. These representations, to be useful, must be shared and understood. Knowledge maps increase the probability of successful communication when map-makers and map users share the same symbols or representations or the "legend" which accompanies the knowledge map is sufficiently clear, simple and useful (Seeman and Cohen, 1997).

#### ORGANISATIONAL CULTURE

Organisation culture and leadership form the foundation for successful knowledge management implementation (Kim et al., 2003). The absence of active management involvement is likely to mean that the knowledge mapping process will be handicapped by insufficient time, money, and talent. That 'support vacuum' also signals to potential users that the mapping process and map are not an essential part of the work of the organisation.

Results of the current study indicated that, executives generally believe that management support and organisational culture are critical factors for successful deployment of knowledge mapping initiatives. Also, the current study revealed that 48 out of the 59 (81%) interviewees stated that managers who are, in the main, in charge of environmental or social responsibility issues are mainly responsible for providing leadership for managing sustainability-related knowledge. However, the remaining eleven (11) interviewees mentioned that knowledge management officers are mainly responsible for broader sustainability-related knowledge management practices. The firms participated in the current study, did not have any monetary or non monetary incentives as rewards for knowledge mapping. The lack of rewards combined with the low level of assessment as part of annual performance reviews could perhaps hinder knowledge mapping practices.

In spite of these difficulties, an important functionality of the knowledge map still is to enable the user to browse "knowledge holdings" both inside and outside of organisational boundaries. Such maps must be able to structure knowledge to coincide with the way that people in the organisation think about knowledge, how they prefer to retrieve it, and they must be able to differentiate functionally between tacit and explicit forms of knowledge (Duffy, 2000).

An effective knowledge map can change the culture and behaviour of an organisation, if management supports and demonstrates that change. Creating and maintaining the knowledge maps is a leadership responsibility that can be supported by good knowledge management practices and often the introduction of knowledge management technologies. For example, if it becomes clear that people just do not know what the skills and expertise of others are, an organisation may accelerate its adoption of technologies to support expertise

location, communities of practices, virtual meetings, instant messaging, and so on. Face-to-face or other real-time programmes that bring people together to share their individual experience and expertise start to break down the “don’t know” barriers.

The concept of culture is particularly important when attempting to manage organisation-wide change (Senge, 1999; Senge and Carstedt, 2001). Practitioners are increasingly coming to realise that, despite the best-laid plans, organisational change must include not only changing structures and processes, but also changing the organisational culture as well. This is also the case of knowledge map deployment, which demands a cross-functional teamwork, commitment, and active participation.

#### MAPPING TACIT KNOWLEDGE

Nonaka and Takeuchi (1995) acknowledged the distinction between tacit knowledge and explicit knowledge. Tacit knowledge can be defined as implicit knowledge of how things work in practice and thus knowledge based on experience. Tacit knowledge applies to specific contexts and is therefore practice-oriented. As Wagner and Lynn Carter (1996) describe it, tacit knowledge is the practical know-how with a particularly important function during the conduct of a job or task. For practitioners, tacit knowledge remains largely problematic in terms of methods of mapping and capturing. The view has emerged that the challenge of KM is to understand how to create practical solutions to support individuals, groups and organisations as they generate and capture multi-faceted knowledge so as to suit the particular requirements of their application context (Despres and Chauvel, 2000).

Much of the knowledge within organisations is experience-based and tacit in nature. Some organisations have been successful at collecting and storing explicit knowledge in organisational databases, but are not always good at tracking and sharing tacit knowledge (Woo et al., 2004). Knowledge mapping aims to optimise the efficient and effective use of an organisation’s knowledge base by addressing the question of how one can best establish the knowledge that is available within an organisation.

Despres and Chauvel (1999) point out, in relation to knowledge mapping, that “individuals and organisations function within information environments of their own making”. This implies that the ways that knowledge is generated, sought out and used, are building blocks for a “tacit” knowledge map, which can be reconstructed in an active knowledge mapping activity. However, this also has implications for how the functionality of a knowledge map should be seen. A knowledge map must build in a definitive amount of divergence as well as convergence of focus: i.e. an ability to maintain attention to other areas than those that are currently focused on, as well as enable a specific focus on certain sub-fields.

As noted earlier, the results of the current study indicate that executives believe that mapping sustainability-related tacit knowledge is difficult. In the current study, 43 interviewees out of 59 (73%) stated that mapping sustainability-related tacit knowledge is difficult because of its dynamic character. Lack of time, lack of techniques for knowledge capture and sharing, lack of an appropriate culture, and lack of rewards are highlighted as some of the main concerns associated with mapping sustainability-related tacit knowledge.

Knowledge maps have often been geographic in nature, thereby identifying where knowledge is situated rather than which knowledge types are at the heart of the business process is normally the focus. This approach has clear disadvantages insofar as it addresses mainly the 'knowing who (to ask)' knowledge type. Thus other valuable forms of knowing (such as why, how and what) may not be captured in the knowledge map (Swart and Powell, 2006).

## CONCLUSION

Sustainability is about building a society in which a proper balance is created between economic, social and environmental aims. For businesses, effectively managing sustainability initiatives could lead to the creation of new ways of working, new products, services, and new market space. Today's challenge for the executives lies in attaining levels of comfort with respect to social responsibility, economic viability, and environmental sustainability, while protecting the heritage of future generations. To improve organisational sustainability performance, executives have to recognise and better understand the key sustainability-related knowledge assets available within and across organisations.

The current study reveals that achieving sustainability means change for the industry, and that such a process of change depends on the ability of stakeholders and individual organisations to manage and work with new knowledge. This paper has outlined the key challenges associated with mapping sustainability-related knowledge. The key challenges which organisations face in mapping sustainability-related knowledge are: mapping of dynamic knowledge, cross boundary knowledge mapping, knowledge representation, organisational culture and mapping tacit knowledge. Mapping sustainability-related knowledge is an integrated and complex process. Given that the research reported on in this paper is largely exploratory in nature, the results presented here are only tentative and of limited value for the purpose of generalisation. Therefore, additional research with more elaborate and better articulated designs is therefore called for, to further explore the complex mix of key challenges which organisations face in mapping sustainability-related knowledge.

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