The importance of SME knowledge network training: a key to organizational sustainability

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ABSTRACT
This paper will examine specific elements of knowledge transfer methods that SMEs themselves need to become aware of, identify with in their organizations and actively encourage. The understanding, identification and facilitation of knowledge network transfers create the basis for sustainable organizational knowledge structures. SMEs are not a cohesive group and can be particularly economically vulnerable, making it difficult for policy makers and educators to target and actively support this group. Successful SME programs with regards to education and training have been top down approaches, with inconsistent results. The break from the traditional top down approach can enhance an all elements of an industry sector by beginning to empower and train SMEs to build their own sustainable knowledge networks. Enhancement of an entire supply chain begins with the SME as an individual element.

1. Introduction
The development and understanding of tacit knowledge networks within SME organizational structures began with investigations into small working groups, teams SMEs. Understanding what conditions and elements were necessary for supporting both social and technological changes, fostered understanding of the criteria for internal knowledge networks. These networks were critical for the emergence of quality processes (both tacit and explicit) within working groups or SME organisations, which impacted their immediate and wider external knowledge networks. These transfers of knowledge exchanges occurred simultaneously, within and between knowledge networks on all levels.

For the purpose of this paper, tacit knowledge exchange is defined as the informal transfer or exchange of knowledge between individuals and groups (as expertise) through informal networks. Nousala (Nousala et al. 2005b; Jamsai and Nousala 2007; Nousala and Terziiovski 2007) described tacit knowledge exchange or transference through networks as being instrumental in the management and implementation of knowledge within and between distributed operations or organizations.

Managers and business owners are grappling with finding an appropriate way or means to support monitor and maintain (in a sustainable manner) any new tacit knowledge that emerged during the development of new products and services. Maintaining sustainable processes is crucial for ensuring long term sustainable success for organizations and extended networks such as regions and cities.

This poses the question of how individuals and relevant working groups within distributed
SME organizations transfer their tacit knowledge consistently within and beyond their organizations. This is not only a complex systems question but also one of scalability. Without understanding how and why elements of networks behave in such complex systems, the issue of sustainability can not be identified, understood, or implemented. Scalability offers understanding towards the implementation of methodologies within systems and that support their networks in sustainable way (Nousala and Jamsai-Whyte 2010).

Scalability can be likened to the interoperability of SME sustainability. Emergent elements that need to be identified by SME management, are crucial criteria for achieving sustainable socio – technical network of knowledge exchange within and beyond SME knowledge structures. SME organizations are like any collective working group that are made up from a multitude of different types of functions and operations with specific issues regarding the approach of tacit knowledge transference, particularly, within a highly operational or project orientated environments is difficult for SMEs to sustain (Nousala and John 2004).

Training methodologies for SME sustainability, need to address the following key concerns (Nousala and Jamsai-Whyte 2010; Jamsai and Nousala 2007):

- Implementable methodologies are needed that consider the interactions of SMEs within their regions as complex organizational systems.
- Such methodologies need a holistic approach; reductionism as an approach will not work with complex systems.
- Scalability is a fundamental aspect of holistic methodology in understanding different scales within a system such as the scope and vulnerabilities.
- Integration of human based systems and the physical organizational operational processes and their networks is crucial for the basis of a holistic methodology.
- The areas of expertise required as part of a holistic methodology would be the combination of socio-technical systems (bringing together practice, physical structure, purposes and constraints i.e.; people, processes, infrastructure and the constraints on them).

- The following are the areas of expertise which are needed in order to attempt a holistic methodological approach:
  - Cognitive systems engineering: the practical implementation aspect
  - Cognitive systems facilitator: the formulation of business strategies
  - Cognitive systems researcher/scientist: formulating and developing theory and new innovative research for practical applications.

2. Methodology

2.1 A Case Study Approach

The case study, focused on an SME interacting with a larger global entity, based on a series of interviews over a six month period (with follow up discussions).

The methodological approach focused on the development of the individual and collective experiences of the organizations as follows;

Level 1: key individuals within the SME organization focused on their knowledge exchange activities. These activities were carried out by tracking what the individuals concerned considered valuable exchanges, between them selves and other groups of individuals within the SME organization.

Level 2: Involved the individuals within the SME organization to review their interactions with external knowledge exchanges, including frequency and intensity, through a series of semi-structured interviews was conducted with and between a core group of individuals within the SME organization.
What followed was a comparative analysis of the activities through knowledge mapping techniques of key individuals to gain an understanding and awareness of the processes and individual interactions on multiple levels (Nousala 2009a; Nousala et al. 2005; Jamsai and Nousala 2007).

An important element of the investigation, was that access was given to all levels within the SME organizations and staff involvement was openly supported by management (if not always understood). The series of interviews were developed as a “snapshot” approach which tracked the company’s emergent issues relating to tacit knowledge, thus identifying and highlighting various aspects of the knowledge networks. The snapshot focused approached elicited in a short time the data required for the study. The snapshot profiles were built up over time through the series of interviews, rather than using a more lengthy surveys approach (Nousala and Jamsai-Whyte 2010).

3. Knowledge exchange for SMEs

3.1 Understanding horizontal knowledge exchange for SME training purposes

The previously discussed case study approach illustrates the development of tacit knowledge and how it was transferred within and beyond the boundary of an SME to interact as part of a larger complex system.

This section reflects the two levels presented in the case study discussion. Firstly, discussions regarding level one of the case study, presented how individuals within the SMEs became aware of tacit knowledge behaviour and constraints in order to carry out their usual routines and product development. Various methods were developed to track valuable tacit knowledge exchanges, occurring on a continuous basis, between key members network. Secondly, the activity of individuals that were interacting beyond the constraints of the SME organizational knowledge network.

The analysis of the respective knowledge networks showed how the hierarchy of tacit knowledge and their boundaries behaved. This behaviour shows the importance of the tacit knowledge exchange role between different levels of social networks and the subsequent exchange between tacit and explicit knowledge, and emergent outcomes.

The theory which informs the discussion of part one and part two in 2.2 is based on the Popper’s three world model (1994;1972). The exchange between tacit and explicit and the SME and their larger knowledge networks occurs between “World 2 and World 3” as shown in figure 1.

![Figure 1. Modification of Popper’s three worlds diagram to show cyclical movements. The circle emphasizes cyclic exchanges between world 2 and world 3 as world 2 attempts to represent and interact with world 1. (Nousala 2006;2009b)](image)

The next series of figures are a selection from a larger previous study (Nousala and Hall 2008) which illustrates an understanding based on a number of similar cases of how the individuals of SME organizations work with their respective knowledge networks to create or engage existing or emerging knowledge communities. Over time, these becomes autopoietic and robust enough to sustain itself against fluctuations in environmental resources and variable management (Nousala and Hall 2008).

Fig. 2 depicts the situation within the larger organization where the key individual (the “human attractor) is universally known for a particular interest. Formation of a community is positively and negatively constrained by higher level needs and enabled by the availability of appropriate components and resources based on organizational history and circumstances. Presumably, after inputs used and outputs produced are
accounted for there will be a net benefit to the organization from addressing the higher level needs (Nousala and Hall 2008).

Fig. 2. A social network created by a "human attractor" (Nousala et al. 2005) within the organization. "Faces" in these figures correspond to people/actors belonging to the organization at the level of subsystems/components. 

a. A "human attractor" seeking knowledge to address a high-level organizational imperative or need.
b. Other seekers socially transferring knowledge relating to what the "human attractor" seeks to know for the benefit of the organization. 
c. Other actors in the organization who are not connected to the seeker's current interest.
d. A knowledge transfer between individual actors. Line weights indicate strength of the connection. The open vertical arrows indicate the possibility that the community may assemble and generate knowledge that will be valuable in addressing organizational needs (Nousala and Hall 2008).

Fig. 3. The coalescence of a community of interest (CoI) around a "human attractor". The human attractor seeks knowledge to solve organizational needs addressing high level imperatives and goals. Bright smiley faces represent people/actors receiving organizational/social rewards for their involvement in addressing the organizational need. Such rewards reinforce the individuals' involvement in addressing the corporate need. Open vertical arrows indicate the value/importance of the assembled, ordered and directed knowledge in addressing higher level organizational requirements. The light dotted line surrounding the attractor’s network indicates that participants and others begin to see the network as a specialized community addressing particular needs (Nousala and Hall 2008).

If the human attractors have a public profiles within the organization, other individuals in the organization with similar interests (i.e., other “seekers”) will tend to join the attractors’ personal network. If these seekers receive organizational/social rewards for their involvement, a community of interest may gather around the attractor, as indicated in Fig. 3. Organizational management can impact the development of a community by either facilitating its activities or create dis-intergration by lack of awareness through internal organizational policy or behaviour. These networks are constantly occurring within any organizational entity. The SME knowledge networks are capable of forming and dismantling networks at relatively high rates. It is therefore, very important that SMEs be given tools and methods for becoming aware of the type of fluid type of emergent entities they are capable of being.
Human organizations are hierarchically complex adaptive systems. Within these systems knowledge exists at many different levels in tacit or objective forms. This knowledge is necessary for the survival of the organizational system. Individual and organizational knowledge is held in a variety of forms. These different forms of knowledge range from tacit organizational routines belonging to internal communities (Nelson and Winter 1982) to physical layout of plant and offices (Nelson and Winter 1982) and corporate documentation (Hall 2003a; Nousala and Jamsai-Whyte 2010).

4. Findings
The case study revealed that the understanding of the elements (tacit protocols) necessary for sustainable practice and processes is relevant to the successful development and sustainability of any working group, team or SME organization. ‘Tacit protocols’ are aspects of structural organization in the form of dynamic physical and social (i.e., “routines” in Nelson & Winter’s 1982 sense) that contribute to and facilitate TKE. Tacit protocols both (a) exist in Nelson & Winter’s sense as part of the organization’s tacit knowledge, and (b) are concerned with the exchange among individual organization members of personal tacit knowledge of organizational significance. Communities of interest (CoI – Nousala et al. 2005, Nousala 2006) and practice (CoP – Wenger and Snyder 2000) are examples of tacit protocols facilitating the creation and sharing of organizational knowledge (Nousala and Hall 2008).

Without the foundation of sustainable practice and processes, the build up of the internal knowledge networks will not occur. Instead, there will only be information systems and management, which do not function in the same way and can not take the place of tacit knowledge networks (Nousala and Jamsai-Whyte 2010; Nousala and John 2004; Nousala et al. 2005b; Jamsai and Nousala 2007; Hall et al 2009). Each member of an organization are involved with specific practices and processes and are in effect “gate keepers” (Dunphy, Griffiths, Benn 2003, p14). These members attended the meetings and negotiated standards and contribute qualities with a view to making this process as sustainable as possible. Without this input, it would not possible to sustain the knowledge transfer process (Nousala and John 2004).

5. Key Lessons learned
Nousala (2006) discusses the learning cycles building organizational knowledge involve interactions among the human members of the organization. These cycles translate into evolutionary changes in organizational behavior that also involve changes to individuals’ behavior in the organization — in what can be described as organic, evolving phenomena (Garvin 1998; Goldstein 1999; Goleman 1998). However, what has been codified is then no longer tacit, and the absence of a shared contextual background may lead to misunderstanding or lack of understanding by those who only have access to the explicit record. As described by Choo (1998), direct tacit-to-tacit knowledge may also be “regularly” transferred by “imitation” (Nousala and Hall 2008).

6. Conclusion
For SME organizational practice, it is critical that the fundamentals of social complex adaptive systems be understood and delivered in a practical manner. The key elements for developing appropriate training methods for sustainable SME organizational practice, requires holistic understanding of the SME as a complex system its self. The interaction between individuals, their knowledge networks and the impact these systems have on one another are key to understanding training implementation practices and sustainable SME organizational entities.

In terms of training for understanding specifically SME organizational systems. This research area is a significant as an emergent field of social complex adaptive systems (socio-technical) focusing on the implementation of processes, required in this multi-disciplinary field. The skill set required is diverse and we have yet to develop comprehensive training methodology to adequately address the current and future needs of a highly dynamic sector of our community.
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