

Abstract Number: 008 - 0306

NOVEL routes to performance improvement in lean organizations: Networking and the Organizational Value of External Linkages

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POMS 19th Annual Conference, La Jolla, California, U.S.A. May 9 – May 12, 2008

Abstract

The ability of an organization to innovate and improve is related to its ability to learn. Much of the literature concerning this subject focuses on knowledge management and how organizations utilize the knowledge of their own employees and learn from past projects. However, this process is also influenced by organizational absorptive capacity for new knowledge, which is reliant on good linkages with external knowledge sources and a participative culture, with organizations more willing to adopt knowledge-intensive innovations if they have high organizational learning capacity, although lean organizations may not allow for much idea time. This paper reports on research being undertaken with a post-lean company and its ability to learn from other organizations. The performance improvement work taking place in association with the research team at the case study organization will inform development of a framework of

interventions for maximizing innovative potential of considerable interest to industry and academia alike.

1.0 Introduction

Defining innovation is neither easy nor clear cut as it means different things to different people. Sometimes confused with invention, often used interchangeably with creativity, innovation has different types, comes in different forms, has different associated theories and is defined differently in the literature (Rickards and Moger 1988; Nystrom 1990; Vrakking 1990). Nevertheless, innovation can be described generally as the process of implementing an idea or invention that may be carried out a long time after idea creation, and potentially by different actors. For the purposes of this paper, innovation is defined as the process of bringing new and improved products and processes to market; developing, adopting and adapting manufacturing processes to enhance productivity and product quality; developing, adopting and adapting business practices to enhance the performance of the firm.

2.0 Understanding Innovation

Depending on the context, innovation can be classified as product or process, where product innovation is essentially about change in the product or services that an organization offers, while process innovation involves change in the technology and supply of the product or service, or in its distribution (Tidd, Bessant et al. 2001). Utterback and Abernathy's (1975) dynamic model of the innovation life cycle reflects the interactive nature of product and process – change to either one may impact on the other. It relates the process of innovation with the degree of incremental or radical technical change and shows how product innovation precedes improvement in the process innovation.

Innovation can be further classified as incremental or radical depending on whether the innovation is an improvement to an existing product or process, or totally new, where *new* can mean new to the market, to the industry or simply new to an organization. Incremental or continuous innovations evolve from the iterative nature of the process of innovation, and provide new features, benefits, or improvements to the existing technology in the existing market. Radical or discontinuous innovations result in a new market infrastructure, causing discontinuity on a world, industry or market level and creating a previously unrecognized demand by the consumer (Garcia and Calantone 2002).

West & Farr (1990) distinguish between innovation at the individual, group and organizational levels, and suggest a lack of research in the field of innovation in working groups. Extant literature has tended to concentrate on the individual level, with not enough attention given to the work group (King and Anderson 1990) or organizational level (Fagerberg 2006). Understanding about the development of innovation has evolved through five generations from simple linear sequences to more complex network models.

Activity focused models tend not to take account of innovation in the organizational environment where boundary spanning is typical and there are high levels of integration. Rothwell's fifth generation model is that of a continuous innovation process system based on integrated systems and extensive networking leading to increasing flexibility and customized responses (Rothwell 1994). Organizational mastering of the fifth generation toolkit is as much about understanding what motivates people to innovate as it is about developing technological strategies, the former being a key focus of the current research.

Interaction with customers and suppliers, and through professional and social networks, for example, brings about contact with people and ideas that may challenge the accepted way of thinking about things (see for example the research on the importance of "weak ties" to

innovation: (Granovetter 1973; Granovetter 1982; Bryson and Daniels 1998). The concept of a psychological contract that sets the dynamics for the relationship between an employer and an employee (Rousseau 1995) is distinguishable from the formal written contract of employment in that it represents the mutual beliefs, perceptions, and informal obligations inherent in the relationship and defines the detailed practicality of the work to be done (Conway and Briner 2005; Wikipedia 2006). The psychological contract is a constantly changing set of expectations that, although unwritten, can be a significant determinant of behaviour in organizations. Perceptions of violation can have lasting effects on trust, with a concomitant impact upon innovation (c.f. Robinson and Rousseau 1994; Miranda and Kavan 2005; Patterson, West et al. 2005).

2.1 Barriers and Enablers

Research on individual innovation reviews a range of blocks to creativity that challenge a person's beliefs and values, self-image and the perceptual ability to recognize opportunities and threats (King 1990). Important factors for innovation at the level of the team or working group have been suggested to include leadership and cohesiveness, together with group longevity, composition and structure. At the level of organizational innovation, resistance can be based on selective perception and the social systems factors of vested interests, rejection of outsiders, misunderstandings, incompatibility of innovation with organization structure, and lack of top level support. Further issues with the potential to inhibit innovation include project based working patterns, lack of technology, and lack of time, resources and staff. Indeed, this last point features alongside five other barriers to innovation that have been identified (Loewe and Dominiqini 2006). In terms of the propensity to be innovative, an organization's culture may also have a detrimental effect.

2.2 Measuring Innovation

Traditional indicators of innovation incorporate measures that look at inputs to the innovation process: R&D expenditure, for example, and outputs such as patents. Given that only a proportion of innovating firms conduct formal R&D and, hence, are able to distinguish between it and other expenditure, such indicators have significant problems, while the use of patents varies greatly from firm to firm and between different industries.

The focus for this paper is on firm or organizational innovativeness, which has been defined as the propensity for a firm to innovate or develop new products (Garcia and Calantone 2002, after Ettlíe, Bridges et al. 1984); or the propensity for a firm to adopt innovations (Garcia and Calantone 2002, after Damanpour 1991; Rogers 1995). While most studies just take one point in time, Subramanian (1996) believes that measures of innovativeness should include a temporal aspect. The same can also be said for the measurement of organizational culture and climate.

2.3 Culture and Climate

Organizational culture lends itself easily to explanation and has been defined as “the specific collection of values and norms that are shared by people and groups in an organization and that control the way they interact with each other and with stakeholders outside the organization” (Hill and Jones 2004). In a review of instruments for measuring climate, Mathisen and Einarsen (2004) assess the effectiveness of five such instruments and report support for two: the KEYS instrument (Amabile, Conti et al. 1996), and Anderson and West’s (1998) Team Climate Inventory (TCI), both of which are used in the current research.

The literature on organizational culture provides a number of instruments and models for its assessment, with the Organizational Culture Assessment Instrument (OCAI) of Cameron and Quinn (1999) chosen as the most appropriate. Based on competing values and resulting in one of

four culture types, the OCAI assesses how things are and identifies how people would like to see it change. It exhibits strong evidence of reliability & validity, is relatively easy to administer, includes support for the analysis of findings and provides guidelines for further activities, which makes it eminently suitable for application in the current research work.

The TCI is used at the individual level and then aggregated to team level and lends itself well to the current investigation. The KEYS instrument measures perceptions on the four different levels of group, organization, individual and supervisory and the results map on to and enhance organizational assessment on continuous improvement. The OCAI displays current and desired positions for organizational culture, reflecting the temporal aspect desirous by Subramanian and with the potential for further application after a period of time.

2.4 Case Study Organization

A large organization in the manufacturing industry, Company A is contributing to a project where the research team is learning through interaction with key players in the innovation system, and through that interaction improving knowledge about the innovation system and how it operates. The analysis is taking place at the organization and production system levels, enabling detailed understanding of industry mechanisms and allowing ideas to be tested in their context of application.

The remit of the current research project is to investigate the influences that have promoted and inhibited innovation in an environment that has implemented a lean strategy and reduced the workforce to a quarter of its pre-1990s size without loss to the level of production. The performance improvement work that is taking place at the case study organization is of considerable interest to industry and academia per se, and to this research in particular. The main focus for the organization is to address the question of how to be far more effective in learning from external sources and, as such, Company A is committed to full participation in the current

investigations through provision of the necessary access for completion of the planned research activities.

3.0 Research Methodology

A hybrid research methodology strategy is being used to gain an in-depth evaluation of the experiences of the collaborating partner. The research process utilises structured and semi-structured surveys, individual face-to-face interviews, and interactive evaluation and discussion. Cameron and Quinn's seminal work comprises a comprehensive set of tools and procedures for the diagnosis and change of organizational culture (the OCAI), administered alongside the KEYS and TCI instruments for measuring climate. The aim is to use these innovation and psychometric inventories and measurements in order to identify and relate the determinants of barriers and enablers to innovation, and to provide advice on how firms can be more effective in, for example, learning from external sources. In association with extant research within the organization, resultant findings will be analysed and used to develop a framework of interventions for maximising innovative potential and thence to disseminate through national/international conferences and journal papers, and through collaboration with academic colleagues and senior managers from different industrial sectors.

Initial interviews were carried out for the purpose of immersing the researcher in the organization and providing further insight to the organization, its environment, working practices, manufacturing processes and its customers and suppliers. Each interview began with an introduction to the aims and objectives of the research project and facilitated early emphasis upon the confidentiality of individual responses and the separate affiliation from any other management agenda. Interview subjects were chosen in agreement with Company A's Continuous Improvement steering group (CISG) as being representative of most, if not all facets

of the organization: the CISG comprises membership from across all levels and factions of the organization.

4.0 Research tasks and findings

Prior to the commencement of further activities, the researcher undertook the process of “onboarding” with the CISG, to introduce and negotiate the aims and objectives and to gain commitment to the research process from those involved (Brookes, Morton et al. 2007).

4.1 Organizational Culture Assessment Instrument

In accordance with Cameron and Quinn’s procedures (1999), the OCAI instrument was administered to the CISG during a workshop session to gain a snapshot of the individual member’s perceptions on how things are in the organization and how they would like to see it change. Questionnaires were collected for later analysis and the session terminated with the scheduling of a feedback of results and discussion meeting. Analysis of the data revealed a range of differing perspectives that informed further discussion and subsequent activities, the process of which is detailed in Figure 1.

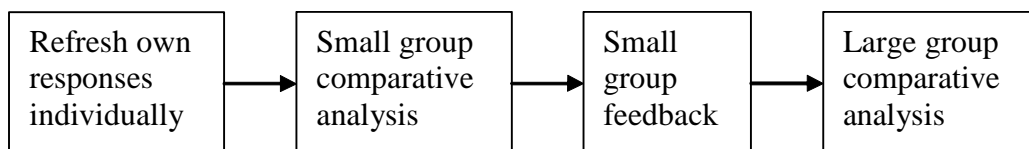


Figure 1: Feedback and discussion workshop

There were a number of issues identified while undertaking the activities in Figure 1, as follows:

- not all the participants who completed the OCAI questionnaire were present at the feedback and discussion session
- the “consensus” represented the view of the majority and tended to have a management slant
- the different areas, levels, and factions of Company A have different perceptions of ‘what is’ and ‘what should be’

However, the purpose of undertaking the assessment was to gain some understanding and facilitate the sharing of other people's perceptions rather than to gain a consensus viewpoint on the current and future organizational culture. As such, the process was understood by all to be a useful undertaking in that it a) raised awareness of differing perceptions for the various participants and b) enabled indication of, and provided support for the next stage of the research work.

4.2 KEYS and TCI

Further discussion with key CISG members assisted in the identification of sample subjects for the collection of data on climate at the organizational and team levels. Subjects were targeted for inclusion based upon factors that include physical location in the organization; membership of work team having already undergone CI training; membership of work team as yet to receive attention from the CI process; and particular factions of employee: cell leaders and shift cohort for example. As with the CISG beforehand, the researcher undertook onboarding with each group of research subjects in order to introduce the aims and objectives of the research; to emphasise the confidentiality of individual responses and the separate affiliation from any other management agenda; and to gain commitment to the research process from those involved (Brookes, Morton et al. 2007). The KEYS (Amabile, Conti et al. 1996) and TCI (Anderson and West 1996) questionnaires were administered simultaneously to the five different subject groups during a face to face session, and the completed questionnaires collected for later analysis. Adopting this process was highly efficient, both in terms of research time and effort and in having the least amount of impact on organizational process, providing access to a wealth of data in a relatively short period of time. Furthermore, the *captive* nature of the research subjects, in terms of organisational commitment to the research, guaranteed 100% response in the data

collection process, effectively eliminating the problem of non-response (Scott 1961). Moreover, questionnaires had been previously annotated by subgroup and, while ensuring and maintaining the commitment to anonymity, were distributed accordingly to facilitate comparative analysis of the instruments per se and of responses by group in subsequent stages of the research.

4.2.1 KEYS

KEYS to Creativity (KEYS) is an organizational survey that assesses the climate for creativity and innovation that exists within a workgroup, division or organization and, in so doing, measures the management practices that impact the workplace and encourage innovation. Operated by the Center for Creative Leadership (CCL), the KEYS instrument helps to identify elements in the workplace that encourage/discourage employees from working at their peak and can accurately identify the conditions necessary for innovation to occur. Analysis of completed questionnaires is returned as a standard report for the surveyed organization in comparison to CCL's overall database of 78 company groups. The standard report aggregates individuals' responses on all of the scales and provides graphical and textual results for the surveyed organization overall. Additional reports were also generated for the current research providing comparative analysis by subgroup with organizational aggregated data. The results in comparison to the overall database for Company A are shown by the graphic in Figure 1.

Two thirds of the standard scores for organizations in the database fall between 40 and 60 and for every scale a higher score is generally associated with higher creativity. Thus standard scores of less than 40 are associated with very low (VL) creativity; 40-45 are considered low (L); 45-55 mid range (M); 55-60 high (H); and 60 plus is very high creativity (VH). The arrow heads at the top of the graph depict the standard scores for the company with highest creativity in the database, while the circles at the other end of the vertical lines at the foot of the graph show the

company with the lowest: standard scores of greater than 80 and less than 20 are shown by the fourth symbol in the key to the graph.

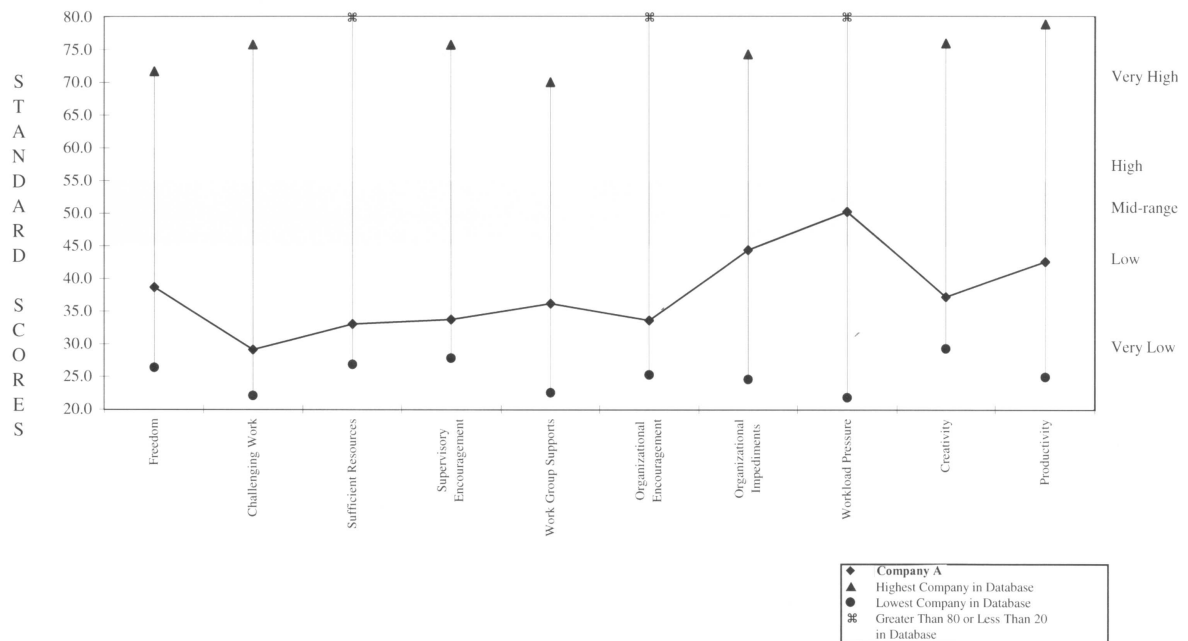


Figure 1: Company A as compared to the CCL database of 78 company groups

Thus, it can be seen from Figure 1 that, other than for the scale on workload pressure, the aggregate standard scores for all Company A scales reside in the low and very low part of the graph. The results by subgroup are given in Table 1.

Group	Company A	1	2	3	4	5
KEYS Scale						
Freedom	VL	VH	VL	L	VL	VL
Challenging work	VL	H	VL	L	VL	VL
Sufficient resources	VL	VL	M	VL	L	VL
Supervisory encouragement	VL	M	VL	VL	H	VL
Work group supports	VL	M	VL	VL	VL	VL
Organizational encouragement	VL	M	VL	VL	VL	VL
Organizational impediments	L	H	L	VL	L	VL
Workload pressure	M	H	M	M	M	VL
Creativity	VL	H	VL	VL	VL	VL
Productivity	L	H	L	VL	L	VL

Figure 1: Subgroup standard scores by comparison to Company A aggregate data

4.2.2 TCI

The Team Climate Inventory (TCI) measures work group climate and is intended as a team development tool. It measures 4 factors that have been shown to be predictive of effective team performance (team vision, participative safety, task orientation and support for innovation); provides an assessment of the team's strengths, weaknesses and effectiveness; and identifies areas that could most benefit from positive intervention. Analysis of questionnaires is undertaken using the software provided, which provides facility for overall analysis by organization, by subgroup and for comparative analysis of subgroup with organization. The standard ten (STEN) profile of Company A's raw scores by TCI scale are provided in Figure 2. Explanation of STEN in association with team climate is articulated in the TCI accompanying documentation as follows:

- Below 4th STEN: Demonstrable need for structured and intensive intervention to redress this climate aspect. Very high utility for specific team building interventions
- 4th to 7th STEN: Room for improvement on climate aspect. High utility for some types of team building intervention
- 8th STEN & above: Climate aspect appears sound but need to keep monitoring and evaluating team procedures

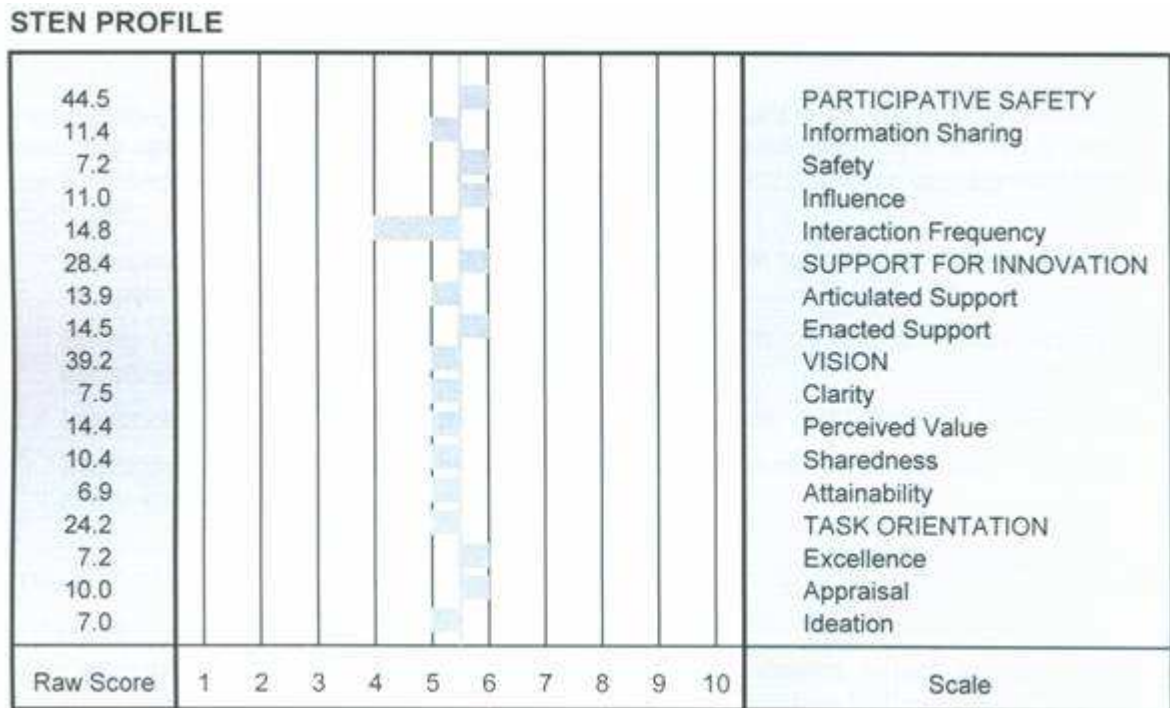


Figure 2: STEN profile of Company A raw scores by TCI Scale

Appendix 1 provides examples of STEN profile, TCI scales and raw scores by subgroup.

5.0 Discussion and Further Research

The main purpose for the current research was to investigate organisation resistance to new knowledge, innovations and productivity improvement, which was achieved by using existing instruments, outlined earlier, to identify structural, situational and/or competence issues that inhibit knowledge utilisation. Cameron and Quinn's assessment instrument (1999) afforded relatively easy access to differing perceptions of Company A's organizational culture, both at the time of administration of the instrument and five years hence. As noted earlier, undertaking the assessment provided insight and understanding, plus the facility for sharing other people's perceptions, rather than the gain of a consensus viewpoint. Thus, participants recognised the usefulness of instrument completion for raising awareness of differing perceptions and encouraged their support for subsequent research activities.

Completion of Amabile's survey instrument (Amabile, Conti et al. 1996) provided insight to Company A's creativity at the organizational level and at the level of pre-defined subgroups: definition of creativity at the level of the individual lie outside the research remit in order to preserve anonymity and the confidentiality of subject data. The graph in Figure 1 shows that the aggregate standard scores for all of the Company A scales reside in the low and very low part of the graph on level of creativity by comparison to the CCL database, except for the scale on workload pressure upon which it lies almost central within the mid range of the comparative data.

Thus, on first sight the results suggest that the climate at Company A is very low on creativity and that specific measures should be undertaken to increase the climate of creativity throughout the organization. However, to obtain the graph in Figure 1 the data for Company A was

compared with aggregated data collected from more than 12,000 individuals, from a broad spectrum of job function, in 78 other organizations, from across a wide range of industries, many of which are highly creative by their very nature. Consequently, findings at the organizational level were treated with caution when presented to Company A and attention was drawn instead to subgroup by comparison to the organization's aggregate data, and the comparative analyses between subgroups. Emphasis was also placed on organizational climate as a description of the work environment rather than of any one individual, where work environment is the personalities, styles, policies and interactions of many people: the findings serve as a focus for the group to improve work environment for creativity by strengthening stimulants and removing obstacles. Moreover, a health warning was also issued to the effect that it is only natural to focus on lowest scores as they likely point to areas for individuals/groups/organizations to target for improving. However, any one result should be considered in the context of the organization: resources, for example, may not be something within the control of the specific group – better to target an area where it may be possible for an individual or group to have some influence.

Simultaneous administration of Anderson and West's (1998) multidimensional measure of work group climate enabled assessment of the strengths and weaknesses of each subgroup. The results give an indication of specific aspects of team climate reported at the time, which are subject to change particularly after intervention. Caution was also advised here when reporting back to the organization: the findings on team climate are not a direct reflection of a team's effectiveness; they merely serve as a focus for identifying strategies to help improve its effectiveness.

The KEYS and TCI results from subgroups 4 and 5 were highlighted as being of immediate interest and it was agreed with the CISG that these two would be the subject of a further and more detailed investigation. Research is currently underway to monitor measure and evaluate the innovation processes of Subgroup 5, while Subgroup 4 is the subject of a longitudinal action

research study that is both contributing to and evaluating the development and introduction of structures that are being put in place to assist the innovation process.

The review of the literature in this paper gives an indication of the breadth and complexity of potential resistance to innovation within organizations. In seeking to understand and overcome resistance to foster productivity improvement, examination has been undertaken into the motivational issues; the barriers and enablers of innovation; the culture and the climate within the organization; and the capacity of the individual, the group and the organization to learn. The opportunities for further research include investigating the relationship between a creative climate and a learning climate; mechanisms of innovation at the workgroup level; relating psychological contract to innovation and learning; and identifying the determinants of learning from other organizations, particularly in relation to absorptive capacity and participative safety.

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