FACTORS INFLUENCING TQM IMPLEMENTATION
IN KNOWLEDGE WORK ENVIRONMENTS: AN
INTEGRATIVE FRAMEWORK

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ABSTRACT

The paper proposes a multi-dimensional, longitudinal Total Quality Management System Transformation Model for knowledge work environments tying together individual, group and organizational level processes and variables that influence implementation readiness for and sustainability of TQM. The literatures of work groups, knowledge work, organization development and change, and TQM are integrated.

Key words: TQM, knowledge work, quality
INTRODUCTION

Total Quality Management (TQM) has stimulated the interest of both scholars and practitioners in the United States as a powerful process for achieving competitive advantage in the global business environment. Despite its popularity in the business world, the absence of a consistent theoretical framework that offers a sound basis for practice or research is a serious limitation. TQM interventions are often implemented with no consistent understanding of what matters most in TQM implementation and often without clear expectations of desired outcomes. In the absence of an integrating framework that brings together both the processes and outcomes, TQM has come to be perceived by many as yet another management fad. Of 99 journal articles published on the impact of TQM between 1989 and 1993 only 4% attempted to assess the degree to which TQM was actually implemented (Hackman & Wageman, 1995). In our review of the TQM literature published between 1993 and 1997, in the theoretical writings, we found evidence of a growing recognition of the need for more careful definition of the outcomes and processes associated with TQM (Lindsay & Petrick, 1997) but the empirical literature did not appear to reflect any greater convergence around what constitutes TQM or what the expected outcomes can be.

One of the important trends influencing the nature of work and employment in the late twentieth century is the shift from routine work to non-routine work (Pava, 1983). Accompanying this shift is the proliferation in jobs and professions whose central focus is the development and utilization of knowledge. The terms non-routine work and knowledge work are often used synonymously to designate a broad class of activities whose focus is utilization and development of knowledge in order to reduce uncertainty from decision making and relevant action (Purser & Pasmore, 1992). Research and development activities are a prime example of knowledge work. Unique characteristics of knowledge work that differentiate it from routine work include non-sequential steps in completing tasks, multiple solutions to problems, slowly evolving goals that are not predetermined, a long time frame perspective, and non-repetitive variances versus repetitive variances (Herbst, 1974; Pasmore & Gurley, 1991; Pava, 1983). There has been growing interest in the adaptation and implementation of TQM to knowledge work environments (Purser & Pasmore, 1992; Sitkin, Sutcliffe & Schroeder, 1994) and a recognition that there are significant differences between knowledge workers and their counterparts in more traditional, routine work settings that will effect how TQM is adapted and used (Drucker, 1989; Purser & Pasmore, 1992; Sitkin et al, 1994; Von Glinow, 1988; Yankelovich, 1984). For example, the orientation toward control with its concomitant reduction of variance characterizes the application of TQM in more traditional routine environments. This orientation does not appear appropriate when TQM is used in non-routine or knowledge work environments which seek to maximize learning and encourage variance to achieve innovation and development. Although some steps have been taken in adapting TQM to knowledge work environments in research and development (Eidt, 1992; Francis, 1992; Schonberger, 1992), a consistent theoretical model that ties together the multiple variables influencing TQM implementation and sustainability in knowledge work environments is still needed. This paper responds to this challenge by proposing a model for knowledge work environments that incorporates variables at the individual, group and organizational levels of analysis that influence TQM implementation from a pre-implementation phase of readiness to a post-implementation phase of TQM sustainability.
To develop the theoretical model presented for TQM implementation in a knowledge work environment, four distinct literature streams were incorporated: the organizational development and change literature, the work groups literature, the knowledge work literature, and the TQM literature. The proposed model offers a systematic framework that explains the processes and underlying variables that influence both the implementation and sustainability of TQM in knowledge work environments. The framework presented conceptualizes TQM implementation as a multidimensional process that occurs at individual, group and organizational levels and in different domains of human experience which involve cognitive, affective, attitudinal and behavioral aspects. The framework also conceptualizes TQM as a longitudinal process, with three specific stages delineated, encompassing implementation readiness, implementation of TQM, and institutionalization of TQM on a sustainable basis.

The framework developed makes a significant contribution to the TQM literature in several ways. First, it provides a perspective of the multiplicity of factors that underlie TQM implementation in knowledge work environments, tying them together in a comprehensive, multi-level schematic that goes beyond what is available in the published literature. Secondly, the framework integrates insights and findings from four distinct literature streams that have not previously been integrated, providing a broader understanding of the variables that play a part in the dynamics of TQM implementation. Thirdly, the framework emphasizes the criticality of TQM sustainability by examining variables that appear to contribute to the institutionalization of the TQM effort. Intervention sustainability has been systematically neglected in the change management literature (Srikantia & Bilimoria, 1997). The proposed framework, with its longitudinal depiction also helps to differentially highlight the factors that become salient at different stages of TQM implementation. Lastly, the development of the framework also utilizes findings from the author’s research conducted during a TQ transformation in a knowledge work setting.

The distinct components that constitute core features of TQM include the measurement of customer requirements, the use of cross functional teams, the creation of supplier partnerships, the application of scientific methods, and the use of process management heuristics (Hackman & Wageman, 1995). TQM outcomes may be represented in terms of both process and outcome criteria. The process criteria refer to the degree to which expected improvements in organizational functioning are actually observed, while the outcome criteria, refer to the degree to which expected improvements in bottom line organizational effectiveness are actually found (Hackman & Wageman, 1995). Outcomes distinguished on the basis of process criteria include an expanded range of employee knowledge and skills, appropriateness of task performance strategies, and increased level of task oriented effort. Improved performance in meeting customer requirements, improved organizational performance capability, and increased work satisfaction are examples of outcomes distinguished on the basis of outcome criteria (Hackman & Wageman, 1995). Figure 1 depicts TQM implementation with process and outcome criteria as we have defined it.

The model developed in this paper identifies factors relevant at different stages of TQM implementation. Despite research on TQM implementation (Porras & Robertson, 1990; Steel & Jennings, 1992; Stewart, 1993), we did not find any other model that explicitly examined employee readiness as a powerful antecedent condition influencing TQM success. The model that we present identifies variables that influence implementation readiness in TQM contexts.
These variables cover a broad range of factors which may reside in the individual, the
dynamics of work groups, or the larger organizational system.

There are also complex challenges associated with the institutionalization of large-scale
change initiatives. The proposed model addresses TQM sustainability, an area that is only
now beginning to attract attention (Beer & Walton, 1990; Collins & Porras, 1995; Srikantia &
Bilimoria, 1997). Factors that appear to support the maintenance and consolidation of
changes resulting from TQM implementation are identified at the individual, group and
organizational level.

The change management literature emphasizes the need for continuous improvement
and innovation in organizational practices as a key strategy for success (Morgan 1989;
Srikantia & Parameshwar, 1995; Srikantia & Pasmore, 1996). There is a strong bias in favor
of continuous revision in practices and a relative neglect of how valuable practices, once
instituted, can be sustained (Srikantia & Bilimoria, 1997). The widespread concern over
increasing the range of potential behaviors available to an organization (Huber, 1991) directs
the focus toward the acquisition of new responses rather than toward the retention of existing
ones. Only recently has the literature on organizational change focused attention on the role of
continuity (Srivastva & Fry, 1992). A key issue for scholars and practitioners of organization
change is recognition of the need to balance change with sustainability so that the results of
improvements are maintained. Our multidimensional TQM system transformational model is
presented in Figure 1.

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FACTORS INFLUENCING IMPLEMENTATION READINESS

The proposed model identifies several individual, group and organizational level factors
influencing employee readiness. A more detailed discussion of each of the factors follows.

Individual-level Factors

There is evidence of growing scholarly interest in examining the willingness of
employees to participate both in developmental activities (Noe & Wilkinson, 1994) and in
processes of systemic level change and transformation (Beer & Walton 1990; Pasmore &
Fagans 1992; Stewart 1994). We have identified the following four variables which play a
large role in influencing the readiness of knowledge workers to participate in TQM
implementation: At the individual level, these include 1) the scope of expertise in TQM that
an employee possesses (Pasmore & Fagans, 1992), 2) the degree of individual empowerment
experienced by an employee in the work setting (Sashkin & Kiser, 1993), 3) the level of
employee motivation to apply TQ tools to ongoing task challenges (Walman, 1994), and
4) employee fulfillment (Anderson, Ragusinanatham, & Schroeder, 1994).

Scope of expertise. The acquisition and maintenance of appropriate knowledge and
skills relevant to TQM has been consistently stressed in the literature (Brown, 1991; Deming,
as a variable that may significantly determine the degree to which employees are willing to
participate in organizational change efforts. Given the relatively stronger intellectual and
conceptual orientation of knowledge workers, it may be reasonable to predict that knowledge
availability would take on enhanced significance in knowledge work environments. The scheme presented by Pasmore and Fagans (1992) may be tailored to TQM implementation in a knowledge work environment, creating a continuum of TQM literacy with five levels of employee knowledge, skills and abilities. These begin with the uninformed who lack appropriate knowledge and skills to participate effectively in a TQM effort; the aware, who have general knowledge about the organization’s interest in TQM but lack specific expertise, information or skills; the knowledgeable, who possess a minimum level of competence to engage in the TQM process; the creative, who are able to transcend the situation and apply knowledge from other fields and situations to reconfigure problems of implementation; and, finally, the wise, who know what knowledge to draw upon or approach to take to achieve positive outcomes for TQM implementation. Based on the foregoing scheme, it appears reasonable to conclude that the readiness of knowledge workers to participate in TQM implementation is positively correlated with the degree to which they possess the requisite knowledge of TQM processes and practices.

**Empowerment.** The importance of empowerment has been stressed in TQM settings (Sashkin & Kiser, 1993; Waldman, 1994). The ability and willingness of employees to take appropriate and timely action in the redressal of quality problems is believed to depend on the extent of employee empowerment (Waldman, 1994). Ashforth (1989) explored the role of autonomy over the task domain as an important antecedent condition that influences the implementation of large scale change initiatives. Waldman’s (1994) defined autonomy as “the degree of freedom or discretion a person has over the task domain regarding activities such as determining procedures and scheduling” (Waldman, 1994: 527) and in his model of TQM and work performance, autonomy is depicted both as a “person enhancer” that increases the internal work motivation of an employee and as a moderating variable that effects the extent to which employees are able to significantly influence the system.

The importance of empowerment and autonomy is significantly enhanced in knowledge work environments, given high autonomy needs of knowledge workers (Zabrusky & Barley, 1997). One would expect that an approach that involves the input of knowledge workers more directly in the design, conceptualization and analysis of the system would work more effectively. Imposing interventions without enthusiastic participation will not result in systemic change in knowledge work systems.

Empowerment is manifested by employee participation and involvement in organizations (Pasmore & Fagans, 1992). Given both high autonomy needs and the professional training of knowledge workers, one would expect that TQM implementation in their environments must encourage collaborative participation in the process.

**Motivation.** It would be logical to expect that the readiness of knowledge workers to participate in a TQM process would be influenced both by their perception of the relevance of TQM tools to enhancing work performance and the confidence that improved performance will attract appropriate organizational rewards. Managers in a TQM environment need to use their power to empower others (Waldman, 1994).

Deming (1986) has referred to three distinct sources of employee motivation: the intrinsic motivation inherent, for example, in the satisfaction from proving a theorem; the task motivation that comes from seeing things actually work; and the social motivation found in having one’s contribution recognized by others. In the context of knowledge workers, the
intrinsic motivation associated with work content and the task motivation that goes with the possibility of enduring professional consequences have both been emphasized as primary sources of employee motivation (Amabile, 1990). Moreover, it is also clear that knowledge workers value recognition from multiple sentient groups existing in knowledge work organizations (Resnick-West & Von Glinow, 1990). Because of these factors that impact the motivational pattern of knowledge workers, it would be reasonable to conclude that employee readiness for TQM implementation in knowledge work environments will be significantly associated with the extent to which the employee believes that the adoption of TQM tools will enhance the intrinsic satisfaction associated with work content and lead to heightened visibility among professionally anchored sentient groups.

**Employee fulfillment.** Employee fulfillment is an indispensable dimension of work life (Deming, 1986). Anderson et al (1994) introduce this in their TQM theory as “a multidimensional concept defined as the degree to which the employees of an organization believe that the organization continually satisfies their needs” (p489). Building on the work of others, they delineate three independent components of employee fulfillment: job satisfaction, job commitment, and pride of workmanship. Job satisfaction involves feeling positively about one’s job or job experience (Locke, 1976). Job commitment involves loyalty, identification, and involvement with one’s employing organization (Mitchell, 1979). Pride of workmanship is feeling proud of the quality of one’s accomplishment, such as improving a process or learning successfully (Andersen et al, 1994). In the context of a knowledge work environment, job satisfaction, job commitment, and pride of workmanship take on added significance. Given the propensity of knowledge workers to value their job content and to be intrinsically motivated by the non-routine dimensions of their job, job satisfaction becomes an indispensable condition for continued performance and contribution.

It is clear that knowledge workers typically invest significantly in higher education, are more self directed, and expect special treatment (Drucker, 1989; Raelin, 1985). They value personal self-expression, autonomy, and freedom of choice (Yankelovich, 1984). They are hired for their professional competence and resist “control oriented models of management” (Drucker, 1989). Knowledge workers appear to derive maximum fulfillment from psychic and intrinsic rewards and the most critical source of fulfillment for them is the work itself (Resnick-West & Von Glinow, 1990). It would be reasonable to assume that knowledge workers’ readiness to participate in TQM implementation would be influenced by the extent to which TQM is perceived by them to advance their capacity for professional contributions in their core areas of professional competence, while augmenting their desire for new learning.

In view of the foregoing, the model we propose identifies employee readiness for TQM implementation as significantly influenced by individual level factors that include scope of expertise, empowerment, motivation, and employee fulfillment.

**Group-level Factors**

A number of group level factors appear relevant to employee readiness to implement TQM in knowledge work settings. Based on recent findings, one could argue that the adoption of an innovative program like TQM is less dependent on the technical merit of its design and more dependent on a variety of contextual factors that arise around work groups (Johns, 1993). As Kimberly (1981) argues, “no matter how impressive the performance characteristics of an innovation may be, its adoption will conflict with some interests and jeopardize some
alliances” (p93). Therefore, both intra-organizationally and inter-organizationally, the interplay of interest groups and the dynamics characterizing the operation of multiple constituencies is of crucial significance in determining the readiness of employees to implement an administrative innovation like TQM. The neglect of social context with its attendant complexity in group processes can lead researchers to overlook possible sources of resistance to the implementation of TQM (Johns, 1993). Van De Ven (1986) identifies a central problem in the management of innovation as the inventing and implementing of new ideas through a process of collective accomplishment. A lot of energy, persistence and commitment is needed among many groups of people to implement innovations such as TQM.

We have identified the following five group level variables that enhance the readiness of knowledge workers to participate in TQM implementation: 1) group cohesiveness moderated by supervisor attitudes and problem solving styles (O’Keefe, Kernaghan, & Rubenstein, 1975), 2) level of cooperation among sub-groups within the organization (Anderson, Rungtusanatham & Schroeder, 1994), 3) altering of shared coding schemes and cognitive structures that discourage experimentation (Katz, 1982), 4) sentient groups with which an individual strongly identifies (Resnick-West & Von Glinow, 1990), and 5) conversations in the work setting that balance the exploration of possibilities with initiation of practical action (Ford and Ford 1995).

Group cohesiveness. Group cohesiveness has been defined as the degree of attraction that group members feel toward the group (Seashore, 1954). This is important in determining a group’s readiness to adopt an innovation (O’Keefe, Kernaghan & Rubenstein, 1975; Seashore, 1954). In early empirical work, Griffith and Mullins (1972) found that researchers who had introduced major shifts in their fields of science maintained cohesive bonds with like minded scientists. Creating a supportive, informal organization was an important part of advancing revolutionary ideas in the face of resistance. In the more recent meta-analysis research on group cohesiveness (Evans & Dion, 1991; Gully, Devine & Whitney, 1995; Mullen & Copper, 1994), there is no indication of group cohesiveness being key to the complexities associated with the implementation of a large scale change initiative such as TQM.

An important study linking group cohesiveness to adoption of innovations in knowledge work settings was conducted by O’Keefe, Kernaghan and Rubenstein (1975) who found that the adoption of innovations in scientific work groups was influenced by the interaction of their group cohesiveness and the attitude toward the innovation held by their supervisor. When viewed from the standpoint of TQM implementation, their findings suggest that the more cohesive the work group, and the more positive the attitude of the supervisor to TQM, the greater the likelihood of the group adopting TQM. Conversely, the more cohesive the group and the more negative the attitude of the supervisor to TQM, the less likely is the adoption of TQM.

Based on other research into the cognitive problem solving orientations, there appears to be an interaction between group cohesiveness and the cognitive problem solving orientation of the group. This would be critical given the predominantly conceptual character of the group’s task environment and task challenges. We suggest that the cognitive problem solving orientation of the group would interact with group cohesiveness to produce some predictable
responses to TQM implementation. McDonough and Barczak (1992) distinguish two possible problem solving orientations demonstrated by work groups; the adaptive cognitive orientation representing the tendency to conform to commonly accepted procedures, and an innovative cognitive orientation manifested in a tendency to search for novel solutions. Based on the notion of TQM as an organizational intervention that demands an openness to change and continuous learning, we would argue that highly cohesive groups demonstrating an innovative, cognitive orientation would display a higher readiness for TQM implementation. On the other hand, a highly cohesive group demonstrating an adaptive orientation would display a low level of TQM implementation readiness. From the review of the literature, group cohesiveness in isolation, does not appear to strongly influence the group’s readiness to implement TQM practices (Stewart, 1994). The group’s problem solving orientation and the attitude of the supervisor, on the other hand, would moderate the influence of group cohesiveness on TQM implementation.

Level of cooperation. The creation of a cooperative environment is fundamental to the implementation of TQM. Cooperation is needed in both internal and external relationships to facilitate the full adoption of TQM practices (Anderson, 1994; Deming, 1993). Deming (1993) further stresses the need for the removal of policies and practices detrimental to internal cooperation. He wrote, “we need to think in terms of win-win. There was a time for rugged individualism…times have changed” (p128). Anderson et al (1994) define cooperation in the TQM context as being “synonymous with collaboration among different individuals, groups or organizations where all entities are engaging in non-competitive, mutually beneficial, win-win activities” (p 483).

Purser and Pasmore (1992) emphasize the particular importance of cooperation in knowledge work environments which have been characterized by rampant individualism and the privatization of ideas. Particularly in the context of TQ implementation, they draw attention to the importance of a “perceptual orientation which allows social system members to see the potential value and possibilities in each other’s work” (p64). Harrington (1990) similarly shares the notion of a cooperative ethic, stating that the value and creativity of each person’s contribution in a collective enterprise is contingent on the existence of other value creating people and processes (p148).

External cooperation, which is also important, refers to the benefits of cooperative relationships that exist between a firm and its external suppliers. External conflicts have the consequence of accentuating group think, and hence would not be conducive to the heightened level of awareness that is needed for TQM implementation. A comprehensive literature review by Johnson and Johnson (1989) argues that cooperative behavior produces superior achievement under most conditions, given a variety of tasks and contexts. From the literature, both internal and external cooperation is necessary for the implementation of TQM in knowledge work environments.

Shared coding schemes. Shared coding schemes are cognitive schema used by individuals to perceive, interpret and organize stimuli and signals from their external environment; they are frames of perception, reference and understanding that two or more individuals may come to hold through a process of mutual information and experience sharing. Katz (1982) found that technical and research teams develop stable shared belief systems as they work together over time which are resistant to change. This leads to
perceptual congruity, loyalty to precedents, comfortable routines, and a sense of contentment with customary ways of doing things. Similarly, Weick (1979) found that project members working together over a period of time develop standard work patterns that are both familiar and comfortable leading to a stable structure of interlocking behaviors. These interlocked behaviors form an impenetrable barrier that prevents the absorption of new interventions. Janis (1971) also draws attention to the pressures toward collective conformity widely prevalent in groups. Some of the earliest work in this area was done by Pelz and Andrews (1966) who discovered that even heterogeneous groups of interdisciplinary scientists became increasingly homogenous in perspectives and approach within three years of their working together everyday.

Particularly in the context of knowledge work environments, there is a great need to watch for the risks of cognitive structures and processes that discourage innovation and new thinking. Typically, knowledge work environments benefit from encouraging unexpected variances and deviations that lead to innovation and discovery. The homogeneity in frames of reference implied by shared coding schemes may foster steady state assumptions that may be inimical to the sense of experimentation and orientation to new learning and uncertainty that is demanded by TQM implementation in a knowledge work environment (Sitkin et al, 1994). Knowledge creation requires the deliberate production of entropy (Spradlin & Porterfield, 1984).

**Sentient groups.** A sentient group is one to which an individual is most strongly emotionally committed and identified, a group to which the person turns to for peer recognition and social support (Miller, 1976). The existence of multiple sentient groups in knowledge work organizations results in tension between professional and organizational standards (Miller & Rice, 1967; Resnick-West & Von Glinow, 1990). Knowledge work organizations confront a complex set of challenges arising from the potential dichotomy between organizational task and sentient boundaries (Moenaert & Souder, 1990). This aspect of “dual affiliation” with both the organization and the scientific or professional community poses a challenge to the management of knowledge workers (Pelz & Andrews, 1966). The effectiveness with which the resultant tensions are managed might well determine the commitment level of the knowledge worker to the organization and, in our view, to any programmatic initiative like TQM pursued by the organization. As Zabisky and Barley (1977) point out, management theory has represented industrial scientists and technical professionals as torn between their organizational and professional identities; consequently, strategies to enhance commitment of knowledge workers have mostly emphasized the need to reinforce the knowledge worker’s commitment to the organization.

The appeal to cooperate with a TQM initiative could be couched predominantly in organizational terms (“we need TQM so that our organization can retain its competitive standing”), or in professional terms (“we invite you to look at the contribution that the adoption of TQM can make to advancing your profession and your technical accomplishment within a given domain”). The readiness for TQM implementation in a knowledge work environment would presumably be a function of the degree to which the tensions arising from dual affiliation of knowledge workers to potentially divergent organizational and professional identities is contained by anchoring the TQM philosophy in both organizational and professional vocabularies equally, without diminishing either’s importance.
We would expect that exclusively emphasizing the professional rationale to a knowledge work force would facilitate adoption of TQM practices that may not be organizationally relevant, while exclusively emphasizing the organizational rationale might lead to a dissipation of commitment among knowledge workers who are professional in their allegiance. Particularly in the context of knowledge work, the TQM message must address both organizational and professional concerns.

**Conversations for possibility and action.** A diverse body of literature attest to the importance of conversations as powerful generators for committed action (Flores 1990; Salancik 1977; Weick 1988). Particularly, statements made at ceremonial events and in public forums within the organization are believed to produce commitment to the espoused beliefs or values embodied in the declaration. This would imply that the implementation of TQM would be contingent upon the frequency with which the organization provides for public forums in which individuals have the opportunity to repeatedly recommit themselves to action. Winograd and Flores (1986) distinguish conversations for action and conversations for possibility arguing that both are ingredients of effective implementation. The former are conversations in which things get done, while the latter are generative conversations that open up new possibilities for commitments. Writing in a similar tradition, Ford and Ford (1995) focus on similar types of conversations that managers must engage in to initiate, sustain, and complete a change.

The role of communication in providing information, creating understanding and building ownership of organizational change has been extensively documented (Kirkpatrick, 1985; Kotter & Schlesinger, 1979). The realities of organizations are believed to be shaped by “talking”. Change, within this framework, is seen as occurring in the context of human social interactions, which, through a process of recursive social construction, create new realities (Ford & Backoff, 1988). Changes such as the ones represented by TQM become “a matter of deliberately bringing into existence, a new reality or a set of social structures” (Ford & Ford, 1995: 542). Similarly, Boden (1994) looks at organizations as structures in action that are constituted from interaction to interaction and focus on talk as the most basic and elemental form of this structuring.

In the context of knowledge work environments, research has focused on the flow of information and the patterns of communication that create possibilities for discovery by making essential information available to key organizational incumbents (Pasmore, 1994). Readiness for TQM implementation in such settings should be significantly influenced by conversations that precede TQM implementation and conversations for possibilities that are highly valued by the knowledge worker. When coupled with conversations for action that facilitate the translation of possibilities into tangible actions, such conversations produce new realities valued by knowledge workers. The conversational climate supports an orientation toward new learning and a tolerance for ambiguity (Stitkins et al, 1994). The readiness of knowledge workers to participate in TQM implementation would be contingent upon the extent to which the TQM effort supports this.

On the basis of the foregoing discussion, we conclude that the readiness of knowledge workers to participate in TQM activities would depend upon the level of group cohesiveness moderated by the degree of supervisor support for TQM and the problem solving style of the group, the level of cooperation among sub-groups within the organization, the altering of
shared coding schemes, sentient groups with which an individual strongly identifies, and conversations in the work setting that balance the exploration of possibilities with initiation of practical action.

**Organizational-level Factors**

Many of the contemporary challenges confronting the implementation of TQM are organizational level issues concerned with organizational structures, practices and philosophies. Many of the early originators of TQM thought that product and process quality were influenced by factors that were beyond the scope of individual discretion and accountability (Manz & Stewart, 1997). TQM has consistently asserted that the majority of quality problems are attributable to issues inherent in work system design (Crosby, 1979; Deming, 1986). Only top management is seen as capable of defining and establishing control mechanisms that improve the entire organizational system (Manz & Stewart, 1997). Concomitantly, TQM’s orientation has been toward a process of standardization achieved through the establishment of appropriate systems that leave little to individual discretion. There appears to be a gulf in TQM implementation between the need for front-line worker’s involvement on the one hand and the concentration of decision making authority in the hands of top management on the other.

Hackman and Wageman (1995) raises four organizational system level dilemmas that have influenced TQM implementation: (1) motivating front level employees to continuous improvement, but doing so within a motivational structure designed from the top down; (2) reconciling the TQM stance that extrinsic rewards should not be contingent on performance, with the need for collectively sharing in gains; (3) requiring front line operators to adhere to standardized practices, while strengthening their orientation to learning; and (4) empowering organizational members to be full contributors, but doing so within a structure that is essentially based in a philosophy of top-down managerial control. Given the orientation of knowledge work toward learning, independence and autonomy, their readiness to participate in TQM implementation would be heavily contingent upon the resolution of these dilemmas.

We have identified the following seven organizational level variables that appear salient in influencing the readiness of knowledge workers to participate in TQM implementation: 1) the support for and orientation of top management commitment to TQM (Choi & Behling, 1992), 2) the presence of transformational leaders who are able to guide its overall implementation, (Waldman, 1994), 3) the pervasiveness of competency upgradation activities in the organization (Brown, 1991), 4) the extent to which the design of jobs provides employees with the opportunity for self regulation of work processes (Wall, 1990), 5) cognitive frames invoked in positioning TQM interventions (Bartunek, 1984), 6) the creative tension between the real and ideal identity of an organization (Thomas & Gioia, 1991), and finally, 7) the competition for attention that may result between TQM and the current agenda of the organization (Dutton & Dukerich, 1991).

**Top management commitment.** The TQM literature is replete with proclamations about the criticality of top management commitment for program success. This is only natural given TQM’s belief in the systemic determinants of organizational performance and the accessibility of such factors to top management control. However, there are few empirically validated studies of such top management commitment in the organizational change literature. The closest study we could identify was in an MBO context. Rodgers and Hunter (1991)
concluded when top management commitment was high, productivity gains from MBO programs was five times greater than when commitment was low.

In one of the most exhaustive explorations of the importance of top management commitment in TQM implementation, Choi and Behling (1997) argue that top management’s often unspoken and implicit orientation toward time, market and customers, influences the nature of their firm’s TQM programs. They found that successful TQM implementation is associated with a developmental orientation, which involves upper management’s desire to transform the company into one of the best in the business, focusing on the future and viewing customers as partners in a cooperative relationship.

Not all researchers agree that organizational change comes about from top management commitment. Beer, Spector and Eisenstat (1991) argue that the belief that organizational change comes about through programs sponsored and supported by corporate headquarters is fundamentally flawed. In a four year study of organizational change at six large corporations, they found that successful change programs were initiated not by corporate headquarters but by the general managers of an outlying plant or division. In fact they stated that the visible efforts on the part of top management to affirm support for an innovative program could potentially jeopardize the outcome.

One of the challenges associated with the implementation of TQM is ensuring that the program is supported by top management commitment and at the same time, that the program is driven and sustained by commitment from the grassroots. The emphasis on top management commitment may have the unfortunate consequence of buttressing a dependence on top managers as initiators and guideposts of change, neglecting the central role of grass-root level employees in the implementation (Srikantia & Pasmore, 1996). The problem is intensified in knowledge work environments given the high autonomy needs of knowledge workers and their need to preserve their status against encroachments from top management control. For knowledge workers to demonstrate a high level of readiness to TQM, it would require top management commitment to TQM without it encroaching or excessively interfering in the production of work.

**Leadership.** The importance of individuals who can powerfully champion an innovation has been frequently stressed in the organizational change and innovation literature (Conger & Kanungo, 1987; Tichy & Devanna, 1986). Leadership based on an ideologically anchored vision is important in knowledge work environments. Leadership based on reward-control mechanisms is less appealing in such environments. The literature refers to the former style as transformational leadership and the latter as transactional leadership (Yukl, 1989).

Recent studies by Howell and Higgins (1990) suggest that champions of innovation exhibit more frequent transformational leader behavior, initiate more influence attempts, and use a greater variety of influence tactics than did non-champions. Transformational leadership appears to be more in line with the type of leadership favorably referred to in the TQM literature (Waldman, 1994).

Transactional leadership, on the other hand, emphasizes the clarification of follower roles and goals and the ways in which favorable outcomes will follow from the attainment of the goals. There is an implicit predisposition toward short term individual and organizational goals which would therefore be alien to TQM (Anderson et al, 1990). Transformational leadership, on the other hand, is reminiscent of the “constancy of purpose” referred to by
Deming (1986) which communicates an appealing vision, emphasizing customer service, team work and continuous improvement. Transformational leaders, one might expect, would be effective in influencing followers to align their values with the TQM vision and to sustain enthusiasm in the face of intransigent processes and well established bureaucracy that people encounter as they engage in continuous process improvement (Scholtes, 1988).

**Competency upgradation.** TQM champions have been emphatic in their demand for organizational generated activities geared toward the training and development of members and the upgrading of their work relevant competencies (Brown, 1991; Deming, 1986; Juran, 1989; Walton, 1986). This includes training and development activities encompassing both the technical aspects of a job and relevant quality related knowledge and skills (Deming, 1986; Juran, 1989). In the context of a knowledge work environment, the enhancement of knowledge and skills relevant to TQM implementation would be critical in enhancing readiness to implement TQM. In terms of the framework that we present, competency upgradation activities, such as training, would enhance knowledge availability, and by doing so, support the knowledge worker’s participation in TQM.

**Job design.** In view of our earlier discussion on empowerment and motivation among knowledge workers, it would appear reasonable to assume that employee readiness for TQM implementation in knowledge work environments will be higher when the design of their job provides greater opportunities for autonomy, self regulation of work processes, and an opportunity to identify and pursue novel solutions to existing problems.

Many writers have emphasized the importance of respecting knowledge workers needs for autonomy and their assignment to positions that involve opportunities for new learning, diversity of tasks, and challenge (Kornhauser, 1962; Peltz & Andrews, 1966). Recent notions of emerging organizational configurations in knowledge work contexts have highlighted the steady erosion of hierarchical schemes and the movement toward structures that place a great deal of autonomy and self regulation in self-managed work teams (Pasmore, 1994). Sitkin, Sutcliffe and Schroeder (1994) suggest that one can expect that employee readiness for TQM implementation in knowledge work environments will be higher when the resulting implications for the way work is designed imply movement toward self regulation, regular feedback, and the opportunity to step into the unknown and pursue novel approaches to tasks.

**Cognitive framing.** The success of TQM implementation depends on how top management has framed it. The schemas used in organizations operate like a frame for employees and managers through which they attempt to understand interventions like TQM (Bartunek, 1984; Prahalad & Bettis, 1986). Prior experience with the organization creates a background set of assumptions against which new input about a TQM program is interpreted. The challenge to management is to frame TQM in a manner that attracts broad based involvement. In the context of knowledge work environments, the framing of TQM as a control-oriented device is likely to arouse suspicion, while the framing of TQM as a learning oriented intervention is more likely to stimulate interest (Sitkin et al, 1994).

**Organizational identity.** Organizational identity encompasses widely shared beliefs about the existing character of an organization (Thomas & Gioia, 1991). It forms a potent schematic filter of "deeply ingrained and hidden assumptions" about the organization that actually constrain certain kinds of action (Dutton & Dukerich, 1991). If a new initiative challenges assumptions about the organization that are held by members, cognitive inertia
precludes the possibility of adoption. For example, if knowledge workers in an R&D environment associate TQM with a manufacturing environment, they may reject a TQM program because it does not fit their pre-existing notions of organizational identity as knowledge workers engaged in an R&D environment.

Reger et al (1994) suggest that the impetus for fundamental change will be greatest when the change initiative falls within a “change acceptance zone” that optimizes the tension between what exists now and what is perceived as ideal. When a change does not fall within this acceptance zone, it is perceived as either unnecessary or unattainable. Reger et al (1994) use the term tectonic change to designate changes large enough to overcome cognitive inertia but not so great in magnitude that they overwhelm people with fear. In their view, TQM implemented through incrementalism is too closely aligned to the status quo and does little to awaken employee inspiration for participating in the change effort. On the other hand, change characterized by synopticism is too great in magnitude and may overstretch the organization’s capacity for change, alienating employees and discouraging their participation in the change effort.

The discussion about organizational identity raises interesting questions about TQM implementation in knowledge work environments. The Reger model assumes a shared organizational view across employees. If we think of knowledge workers belonging to multiple constituencies in specialization and function, we have a complex situation of knowledge workers who possess multiple notions of the organization. Distinct organizational views that may be held by contractors, regular employees and members of administrative, developmental and basic research divisions may result in differential patterns of TQM acceptance. Equally, components of TQM may embody constructs that find easy acceptance among some sectors of the work force while provoking resistance among others. Administrative departments may find TQM more palatable than research groups, which may view TQM as a technique more appropriate to routine work. Therefore the implementation of TQM must pay attention to the complexities associated with organizational identity.

**Organizational agenda.** Whatever preceded a TQM program in an organization might influence how the program is perceived by employees, and thus, influence the credibility of the TQM program in ways that cannot be anticipated. Dutton (1996) suggests that the current agenda of the organization affects the fate of a new intervention through both the size of its agenda and its substance. The implication of this construct for TQM implementation lies in the possibility that the organization’s readiness may be determined by factors extrinsic to the TQM program itself. For example, if an organization has implemented several human relations training programs previously, the TQM program may be viewed as yet another human relations program. Alternatively, the TQM interventions that are group process based may attract disproportionate attention at the time of implementation. For example, in a R&D laboratory it is likely that the aspects of TQM implementation that are based on scientific data collection, analysis and research will be more easily understood and supported since they are consistent with R&D activity than those aspects of the TQM implementation, like establishment of cross functional teams or partnerships with suppliers that are not closely tied to the R&D department’s way of working.

On the basis of the foregoing, we conclude that the readiness of knowledge workers to participate in TQM activities is influenced by several organizational level factors that include
the support and orientation of top management commitment to TQM, the presence of transformational leaders, the pervasiveness of competency upgradation activities, the extent to which the design of jobs provides employees with opportunities for self regulation of work processes, cognitive frames invoked in positioning TQM interventions, the creative tension between the real and ideal identity of an organization, and the competition for attention that may result between TQM and the current agenda of the organization.

**FACTORS INFLUENCING TQM SUSTAINABILITY**

As noted earlier, the change management literature emphasizes the need for continuous improvement and innovation in organizational practices as a key strategy for success (Porras & Robertson, 1992). There is a bias in favor of continually revising practices and a relative neglect of how successful practices, once instituted, can be sustained. Only recently has the literature on organizational change focused attention on the important role of continuity (Srivastva & Fry, 1992). A key issue is how to balance change with sustainability so that the results of improvements are maintained.

A discussion of sustainability of TQM interventions in knowledge work environments has a paradox associated with it. The knowledge work literature portrays dynamic knowledge work environments as those in which cognitive and organizational structures are fluid, evolving and amenable to constant revision (Purser & Pasmore, 1992). Indeed, effectiveness in knowledge work depends on the establishment of processes that enable individuals to question governing assumptions and critically examine beliefs, tasks, decisions and structural issues (Bateson, 1972; Hedberg, 1976). Sustainability of interventions in the context of such a dynamically changing environment becomes especially challenging given the primary orientation of knowledge work environment to discovery and change. Sustainability of TQM in such environments is not merely a matter of instituting processes, practices and systems that become entrenched; rather, it is the establishment and sustenance of a mindset given to continuous improvement, discovery and new learning. The challenges associated with sustaining such habits of inquiry, learning and discovery are as formidable as those involved in building sustainability of structures, practices and procedures. The credentials of a knowledge workforce perhaps would predispose them toward questioning a mechanical perpetuation of ideologies and systems; evidence and inquiry become the basis for sustainability.

In our exploration of the TQM literature, there were few references to TQM sustainability, and none about sustainability of TQM in a knowledge work environment. In general, the literature describes organizations as having short term perspective.

Thayer (1984) draws attention to pressures faced by management professionals that interfere with taking a long term perspective. Similarly, McIntyre (1990) laments that organizations expect “nothing more than simple, quick answers to profit relevant questions” (p 29). Building sustainability into organizational interventions like TQM require that the persons guiding its implementation are able to resist the production of quick results at the expense of long term thinking (Dunnette, 1992).

Levinthal and March (1993) state that organizations ignore the long term, big picture perspective, both of which are critical to building sustainability into organizational practices. Similarly, Senge (1990) points out that organizations are better able to detect dramatic dangers than to identify slowly developing threats. Pfeffer (1994) argues that the pressure for quick earnings entrap organizations in an obsession with the short-term perspective. The emphasis in
organizations of verifiable performance management systems reinforces the belief that only those indicators that can be measured in the short-term time are rewarded. For TQM intervention sustainability, tendencies that predispose organizations toward short-term thinking need to be transcended.

Srikantia and Bilimoria (1997) point out that for the sustainability of organizational change interventions, there needs to be a shift in managerial time horizons to a future oriented perspective. Adapting the notion of managerial time horizons to TQM, we identify three different levels of TQM adoption in organizations. Decisions clearly have both current and future implications for organizations. Similarly, decisions and choices that are to be made in the future have present and future implications. The most rudimentary orientation to TQM sustainability is represented by an organization where the pressure for quick earnings produces a simplistic, quick fix approach. Sometimes such an organization may introduce quality management practices to emulate more successful companies (Westphal, Gulati & Shortell, 1997). In these contexts implementation of the quality practices stays at a superficial level with no accompanying fundamental change in thinking since the organization is still entrenched in an immediate results paradigm. At the next level, the organization is concerned with future implications of present day practices, decisions and processes. Here managers are examining how the interventions they have implemented can be sustained or modified over time, and thus the sustainability of TQM is more advanced. The direction of thinking has moved from the present to the future, inquiring into how the current practices will evolve as the future unfolds.

The direction of thinking around sustainable TQM intervention at the next level involves asking “given that this vision is what we are seeking to evolve toward, what are the actions that we need to be taking today”, that is examining action implications in the present while being guided by a vision of TQM anchored in the future.

Contemporary organizational change literature mirrors the short term perspective. With its predominant empirical orientation there is a pronounced bias toward observable phenomena that can be investigated by the empirical methodologies of behavioral science (Srikantia & Bilimoria, 1997). Our disciplines are less prepared to contend with anticipatory reality. Research on the sustainability of new organizational practices requires an epistemological posturing toward the future. Given the difficulty of dealing with the yet unobservable consequences of present day practices and the reluctance of practicing managers to delve into areas that will likely exceed their individual tenure with the organization, it is not surprising that questions of TQM sustainability are not being addressed. The area of TQM appears largely rooted in identification, measurement and correction of variances, activities that are observable, and based in the present. Sustainability of TQM in knowledge work environments requires an expansion of our models to include unobservable cognitive processes that are anchored in the future.

We found a variety of factors at individual, group and organizational levels that influence the sustainability of TQM interventions in knowledge work organizations that are discussed below.

**Individual-level Factors**

As in the case of employee readiness for TQM, the sustainability of TQM in knowledge work contexts appears to be influenced by three individual level factors that include:

1) organizational citizenship behavior leading employees to go beyond the call of duty in sustaining the practice of TQM, 2) the quality of thinking by individuals engendered through the
implementation of TQM practices, and 3) the existence of program champions who provide inspired leadership to help maintain enthusiasm for TQM.

**Organizational citizenship behavior.** Organizational citizenship behavior involves taking initiatives and accomplishing tasks that are beyond the call of duty (Moorman & Blakely, 1993). In TQM settings, it is sometimes difficult to separate work performance from organizational citizenship behaviors (Waldman, 1994), since under TQM conditions employees would be taking initiatives in continuous improvement and teamwork enhancement beyond the call of duty. In Malcom Baldrige Award winning companies, employees demonstrate such behaviors (Blackburn & Rosen, 1993). Waldman (1994) proposed that greater degrees of TQM implementation in an organization would be accompanied by an increasing tendency to define, assess and reward work performance in terms of organizational citizenship behaviors oriented toward the continuous improvement of the group or the organization. In both routine and non-routine work, we would expect that the expression of willingness to go beyond the call of duty would help sustain TQM practices and processes.

**Quality of thinking.** Knowledge work organizations learn how to learn by establishing processes that enable them to question governing assumptions and by instituting processes that critically examine the beliefs, tasks, decisions and structural issues in their organizations (Bateson, 1972; Hedberg et al, 1976). The manner in which knowledge workers frame their environment can influence the quality of their thinking processes and their ability and willingness to learn from error (Purser & Pasmore, 1992).

Purser and Pasmore (1992) draw a distinction between two ways of thinking that are critically important in determining the effectiveness of R&D teams. They use the term “position centered thinking” in reference to those who become obsessed with protecting their position, and with who gets credit, visibility and praise. Such thinking processes lead toward ideational rigidity, producing an inability to reframe ideas and think outside the box. Their second type of thinking is “possibility centered thinking” which results from a “thawing out of one’s rigid static structures, whether they be organizational or cognitive in nature” (p63). It involves visioning capacities and an approach to ideas as “invitations to know” as opposed to staying with what is known.

In the light of their discussion on possibility centered thinking, they observe that “Total Quality Management in knowledge work organizations must pay special attention to the perceptual quality that guides observation and decision making. Hence improving the quality of thinking life of knowledge work will not be accomplished through a mindless application of techniques” (p65). We propose that possibility centered thinking would sustain a continuous improvement mindset leading to the sustaining of TQM interventions in knowledge work contexts.

**Program champions.** The crucial role played by program or idea champions in the adoption of innovations has been well documented (Howell & Higgins, 1990; Schon, 1967; Nadler & Tushman, 1988). Any form of organizational innovation that implies an alteration in standardized routines requires individuals to champion it. Beer and Walton (1990) draw attention to the role of project champions in large scale organizational change efforts. Purser and Pava (1992) highlight the role of idea champions in R&D teams who pursue ideas in the face of cynicism, bringing major opportunities to fruition. It is reasonable to expect that the
sustainability of TQM in knowledge work contexts requires ongoing support from one or more champions who stay committed to the TQM program.

**Group-level Factors**

Just as there are specific individual factors that enhance the likelihood of TQM sustainability, group level factors are also important. At the group level, 1) the continuity of work group membership, 2) shared beliefs in TQM outcomes, 3) the quality of dialogue between group members, and 4) the extent to which the TQM interventions have been integrated across groups within the organization appear to support the sustainability of a TQM program.

**Membership continuity.** The effect of changing group membership on the performance of project and R&D groups has been a long standing concern of researchers with a number of studies exploring the implications of member tenure (Katz, 1982; Pelz & Andrews, 1976; Smith, 1970). Sitkin et al (1994) has drawn attention to the effects of member attrition in TQM implementation. Contingent workers with limited tenure, in his view, constitute a loss to the intellectual resource reservoir of a group. Based on extensive research into organizational structures found in knowledge work organizations, it appears that some form of membership continuity is critical to the sustainability of TQM. Pasmore (1992) describes an ideal organizational form for knowledge work that is constituted by teams made up of “a transient pool of resources who join the project as it requires their expertise” (p167) and a central coordinating group of knowledge workers “who are themselves representatives of the various projects and activities undertaken by the organization” (p167). This provides knowledge work organization structures that have both a stable and a migratory component. In our model, membership continuity in the non-transient central group would be critical in sustaining TQM interventions. The mix of transient and non-transient members in knowledge work contexts could help sustain the vibrancy of TQM by constantly bringing in fresh perspectives through new members while retaining valuable practices in the knowledge repositories of the work groups.

**Shared belief in TQM outcomes.** Srikantia and Pasmore (1996) highlight the role of a consensually shared reality in the orchestration of organizational change efforts. For TQM to be sustainable, group members need to be in agreement that TQM interventions have produced positively valued outcomes. The paradigm shift engendered in TQM settings involves both doubt, which provides energy for exploring alternatives, and conviction which enables active experimentation with new methods of TQM to continue. Through such processes a consensually validated perception of TQM is established which in turn assures the sustainability of it in the organization.

The notion of TQM sustainability as the result of the interplay of processes of doubt and conviction appears to be particularly relevant to knowledge work contexts. Here one would expect to find a highly educated workforce that is susceptible both to doubt through their cognitive orientation that emphasizes questioning of systems and practices and to conviction through the weighing of evidence in attempts to validate performance gains resulting from TQM.

If conviction grows too strong in support of any one methodology or program, sustained learning may be blocked and existing arrangements become reified and difficult to challenge. Knowledge workers, by virtue of their predominantly conceptual orientation, are likely to support the sustainability of those programs that promote their pursuit of learning and discovery and to question everything else (Purser & Pasmore, 1992). To the extent that TQM is experienced as an intervention that promotes the generation and utilization of knowledge, it is
likely to be sustained through the alternating cycles of doubt and conviction so pervasive in knowledge work.

**TQM integration across groups.** Shani and Stjernberg (1995) discuss the challenge of integrating parallel change processes across multiple groups in organizations and the scant attention this has received in the literature. Knowledge work contexts are made up predominantly of transient project based organizational structures. Given the existence of multiple work groups in knowledge work contexts, the integration of changes resulting from TQM implementation across these work groups is critical (Shani & Stjernberg, 1995). The sustainability of a TQM program would depend on the degree to which integration of TQM in work groups was uniformly achieved.

**Quality of dialogue.** The quality of interactive dialogue among knowledge workers has been shown to be an important factor influencing the rate of knowledge development and utilization (Van Lohuzier, 1986). Thus, one would expect that the sustainability of TQM would be significantly influenced by the quality of discourse between members of work groups. High quality dialogue between group members is the primary process through which members of a group begin to develop holistic understanding (Tornatsky & Fleischer, 1990). Systematic analysis of group deliberations is necessary for improving the quality of knowledge work (Pava, 1983) and reduces delays in processing knowledge, by revealing unproductive steps in the current approach (Pasmore & Gurley, 1991). The recognition of knowledge work as predominantly talk-based in character leads us to believe that higher quality interactions will lead to superior quality outcomes, which facilitates sustainability of the TQM process.

**Organizational-level Factors**

As with implementation readiness, it would be reasonable to assume that the sustainability of TQM interventions in a knowledge work context would also be influenced by organizational level factors. The following six organizational level factors appear influential to TQM sustainability in knowledge work environments. They include 1) the degree to which the organization has created a culture based on values and norms consistent with TQM practice; 2) the receptivity of the organization to increased levels of employee participation; 3) the program’s ability to balance the conflicting goals of control with opportunities for learning; 4) the removal of system constraints and barriers to TQM sustainability; 5) a reward structure that reinforces the motivational patterns of knowledge workers; and 6) continuity of leadership for the TQM program in the organization.

**TQM values & norms.** The ideal TQM culture has been described as one with a particular set of values and norms governing work behavior. These include encouraging employees to actively learn about problems, the free sharing of information promoting cooperation and teamwork between and amongst groups of employees, training of employees to deal with problems, and valuing customers (Bushe, 1988; Dean & Evans, 1994; Sashkin & Kiser, 1993). Moorman and Blakely (1993) have emphasized the additional importance of collectivist values in a TQM organization.

Some other cultural values commonly associated with the design of knowledge work systems are also frequently implied as central to TQM. These include the development of self diagnostic capacities, the freedom to question governing assumptions (Argyris & Schon, 1978; Senge, 1990), and an openness to learning by failing (Sitkin et al, 1994). The sustainability of
TQM interventions in knowledge work environments would be supported to the extent by which the culture of an organization is compatible with TQM values and norms.

**Balancing learning and control.** The effectiveness of TQM implementation and sustainability will depend on a program’s capacity to balance conflicting organizational goals of stability and reliability with those of exploration and innovation. This may be reflected in contrasting interventions that seek to increase control with those that seek to enhance its capacity to learn (Sitkin et al, 1994). Similarly, Hackman & Wageman (1995) argues that the long term viability of TQM will depend on the ability of its proponents to resolve the dilemma that TQM poses of inviting employee participation but only until the best practices are identified. What often happens is once the best practices are codified and adopted as benchmarks, this process of standardization becomes a disincentive to continued employee participation and exploration.

In knowledge work environments, standardization through benchmarking is likely to be resisted. Knowledge work organizations learn how to learn by establishing processes that enable them to question governing assumptions, and by instituting practices that critically examine beliefs, tasks, decisions and structural issues (Bateson, 1972; Hedberg et al, 1976). The manner in which knowledge workers frame their perception of the environment can influence the quality of their thinking processes and their ability and willingness to learn from error. Van Lohuizer (1986) asserts that errors in knowledge work are the result of preconceived ideas, and premature conclusions. Purser and Pasmore (1992) point out that barriers in thinking and learning need to be identified in real time through a process of “reflection in action” (Schon, 1983). The readiness and ability of the organization to engage in knowledge seeking activities at the individual, group or organizational levels is characteristic of a sustainable TQM system (Anderson et al, 1994).

Some aspects of TQM stress control more than learning. Control is an appropriate strategy when familiar ways are used for known problems, characteristic of routine work. Some aspects of TQM stress learning more than control. This is more appropriate for unknown problems and the utilization of innovative techniques, which are much more common in knowledge work. A TQM learning orientation appears to be important in sustaining the improvement of process, products and services in organizations and contributing thereby, to the sustainability of TQM.

**System constraints.** Purser (1991) found that the pressure for immediate results sometimes forces R&D groups to converge prematurely on a sub-optimal solution. Amabile (1990), in an interview study of 120 R&D scientists, discovered extrinsic constraints which inhibit creativity. These included evaluation pressure, a feeling of undergoing constant performance appraisals, reward structures that tie specific rewards to specific tasks, internal competition amongst employees, and constraints on methods for carrying out a task. Harrington’s (1990) study of R&D teams also indicated that creativity in accomplishing tasks was hampered by fear of failure, intolerance of ambiguity, and pressure for immediate results. Other constraints on work performance include inconsistent availability of tools and raw materials, inconsistent leadership, supervision practices, and constraints in the physical environment that weaken performance (Davis-Blake & Pfeffer, 1989; Johns, 1991; Kim & Campagna, 1981; Waldman, 1994).

While bureaucratic structures and policies may constrain variation in work performance serving the goals of quality control (Bowen, Ledford & Nathan, 1991), they also act as constraints on creativity in work settings. The sustainability of the TQM program in knowledge
work settings will be influenced by the degree to which system constraints on creativity are diminished.

**Reward structures.** The opportunity to work on challenging problems may be the most important source of job satisfaction for R&D professionals (Purser & Pasmore, 1992). As Von Glinow (1988) has demonstrated, knowledge workers value professional rewards such as the opportunity to work with other top professionals, freedom to make their own decisions, intellectually stimulating work environments, working on leading edge projects, having an impact on national issues, a productive atmosphere, flexible working hours, long term project stability, and the opportunity to address human needs. Although some researchers suggest that the introduction of extrinsic rewards might actually erode professional motivation (Badawy, 1978; Griggs & Mann, 1986; Miller, 1986), we believe that TQM sustainability in knowledge work environments would be enhanced by designing rewards for knowledge workers that are closely aligned with their intrinsic motivation and job content.

**Leadership continuity.** Continuity in leadership is also important in TQM sustainability. In the absence of continued leadership support, strategically reinforcing the cornerstones of the TQM philosophy, the program may lose coherence, resulting in a popularly held perception of TQM as yet another “program of the month.” Beer and Walton (1990) highlight the importance of leadership continuity in institutionalizing organizational change processes. In the absence of leadership continuity, organizations end up being subjected to a broad range of interventions, each of which may constitute the favorite intervention of the person in power, with none being sustainable over any length of time.

**Conclusion**

The paper proposed a multi-dimensional, longitudinal Total Quality Management System Transformation Model for knowledge work environments tying together individual, group and organizational level processes and variables that influence implementation readiness for and sustainability of TQM. The multi-level schematic integrated a multiplicity of factors, providing a more comprehensive model of influences on TQM than what is currently available in the literature. The weaving together of four distinct literature streams that often exist in an isolated fashion, namely the organizational change, work group, knowledge work and TQM literatures yielded a richness of perspective than models that were more dependent on the strength of any one literature stream. The focus on TQM sustainability and the delineation of factors considered important at different stages of TQM implementation supports the development of a more complex understanding of TQM as a longitudinal process rather than as a simple, one shot intervention.

From the foregoing review of the literature, it is clear that TQM implementation in knowledge work settings is influenced by a variety of factors that operate both in concert and independently in impacting organizational readiness for and sustainability of TQM interventions. In many settings, a great deal of attention is paid to the technology of TQM consisting of the tools and techniques developed in such areas as the measurement of customer requirements, the use of cross functional teams, the application of scientific methods to work processes, the use of process management heuristics and the forging of partnerships with suppliers. Not as much attention, in our view, is paid to the plethora of individual, group and organizational factors that exercise a profound influence on the implementation of TQM. The orientation of most organizations toward measurement and control predisposes them to pay attention to the
procedural, technique based dimensions of TQM and to be less attentive to other aspects that create a context for TQM implementation. This subterranean level is perhaps even more important in knowledge work where the variables of interest that influence TQM implementation are primarily cognitive or ideational in nature and therefore even less visible than their counterparts in more traditional, routine work settings.

For TQM research to make a more sustainable contribution to TQM practice, we recommend more empirical studies that tie together individual, group and organizational level variables within the same research design. We need more research that encourages the simultaneous investigation of variables at multiple levels of analysis. Our literature review indicates that the processes and mechanisms associated with TQM implementation are so complex and intertwined with each other, cutting across different levels of analysis that to truly honor the complexity, longitudinal studies that investigate their interaction are needed. The future of TQM will also be supported by a shift in research focus away from the operational, procedural aspects of TQM to a focus on questions of long-term sustainability.

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