



A policy resolution model for knowledge acquisition in quality management

TOGAR M. SIMATUPANG¹ & ANGUS J. WHITE²

¹Department of Industrial Engineering, Bandung Institute of Technology, 10 Ganesha St, Bandung 40132, Indonesia & ²Department of Economics, Massey University, Private Bag 11222, Palmerston North, New Zealand

Abstract *Changes in organizational life force senior managers to rethink constantly their solutions to managerial problems and to examine the whole process to accumulate knowledge. This study explores the integration of policy and practice as a response to change whereby the policy-makers seem to accept mind-shift while preventing mind-set. The objective of this study is to find a new direction in quality management, by challenging existing policy through changing construct reality in mental models. A policy resolution model is proposed to reconstruct reality based on the theory of constraints. The first process of policy resolution is appreciative policy aimed at generating supportive policies. Interactive policy is the second process, which provokes participants to buy-in the change process based on appreciative policy. Dialogue is introduced as a process to acquire knowledge in a policy resolution model. Thus, the policy resolution model allows senior managers to examine continually organizational practice and portray a realistic picture of organizational performance that will satisfy the needs of the inquiry and offer ways for improvement.*

Introduction

The most successful organizations promote a learning climate, i.e. they support the on-going acquisition of knowledge and skill through learning, and encourage learning through creativity, imagination, exploration, discovery and intentional risk-taking (McGill *et al.*, 1992). A learning climate is achieved when employees work and learn with their total potential ability to create synthesis and congruence. Employees have different world views which can create a union of great richness, based on diversity. Mental models represent those internal pictures of how the world works and influence actions of organizational members (Senge, 1990). Surfacing, testing and improving mental models are ways of sharing mental models to improve mutual understanding and allow for a joint commitment to action.

Shared mental models should be complemented by an array of policies as a means to create the desired quality performance. Policies are the concern of management practice (Goldratt, 1990; Mintzberg, 1977). An organization without balanced reforming policies and learning practice is hard pressed to attain changes in innovative quality. Lack of commitment from senior managers in terms of reforming policies can lead to a failure to achieve total quality management (TQM) (Brown *et al.*, 1994). Hence, senior managers should support

Correspondence to T. M. Simatupang (Tel: 0062-22-2508127; Fax: 0062-22-2508127; E-mail: t.m.simatupang@voyager.ti.itb.ac.id).

0954-4127/98/080767-13 \$7.00 © 1998 Carfax Publishing Ltd

quality practice through inducing supportive policies that can transform current mental models.

Senior managers who are responsible for creating the learning climate need to define supportive policies that are conducive for the members' aspirations and managerial intentions. Examples are to explore a synergistic quality practice, to state clear values, to create and carry vision into the future, and to expand the understanding of quality and their ability to create it. However, few studies have been devoted to such reforming policies in quality management. Policies in quality management are often fragmented, involving merely quality issues, for instance a policy statement that consists of the guiding principles. Typically, these policies have a limited ability to provide the innovation and quality leadership necessary to accelerate organizational development.

The intent of this paper is to present directly a framework for the policy-making process which enables managers to devise new explorations of knowledge from TQM practice and also creates shared understanding and actions among participants. The presentation of the framework should provide a needed starting point for research on the process of devising supportive policies based on mapping, challenging and improving mental models.

The importance of policy in quality management

Immutable policies are becoming less useful in a world of rapid technological changes, emerging markets and shifting markets boundaries. Policy-making has come under siege for generating inflexible frameworks, impairing effective decision-making. In today's turbulent business environment, policy-makers are appealing for tools that can modify the outdated policies as the context or environment changes.

Changes can be reached by constantly creating and inducing new policies at every level in an organization. These policies involve changing operating norms, statements, intentions and resource allocation as an interaction between intended and unintended results from an organizational action. In this situation, policy-making is required in capturing information relevant to policy and how to reform such policy (Mintzberg, 1977). More exploration of policy-making needs to be introduced in organizations to create real-time management intervention. Policy-making has been evolving since the questions of what the organization does, why, and with what consequences remain unanswered, particularly in the areas of TQM (Flood, 1993).

A recent practice which has become prominent in analyzing the success factors of TQM efforts is to use a comparative study (e.g. Redman, 1995; Saraph *et al.*, 1989). The results, however, do not reflect the reality in TQM's awareness process of most organizations, since the policy-making process seems hidden from observation, so it is more of an intuitive feeling on the part of managers. Yet senior managers as policy-makers need to know the forces that shape policy-making, to create their own policy-making process, and then to seek solutions to the issue of quality stagnation. For example, how policy can be formulated to focus on the constraint resource on the shop floor, in which the main value-added activities take place to fulfil customers' expectations, is very significant.

A policy can be defined as a prudent scheme or view that intends to influence organizational actions by sharing meanings, commitments and power to attain real progress. Some implications of the notion of policy are: policy is purposive or goal-oriented rather than random or chance behaviour (Goldratt & Cox, 1992); policy consists of causes of patterns of action by the top management team rather than their separate discrete decision (Mintzberg, 1977); policy is what an organization actually does in innovating quality, controlling inventory, or promoting a learning climate, not what they are going to do (Flood,

1993); and policy is a product of social judgement in an organization by the top management team and operational levels (Mason & Mitroff, 1981).

The manner in which these implications impact on the content and process of policy differs among organizations. An organization should decide for itself which aspects of corporate life are most relevant to its own aspirations and work out policy statements for them. In other words, policies should be explicit and flexible enough in nature, enabling them to be quickly revised. For instance, senior managers need to create a supportive policy in which people can legitimately improvise while working to satisfy customers, clients, associates and vendors. This policy enables the employees to capture and disseminate the collective knowledge base that corresponds to competitive edge. Since productivity can just be defined systemically due to the global performance, quality management requires such policy to direct TQM efforts through promoting productive decisions and actions. However, a policy is reformed or renewed depending on the way senior managers view reality. Vickers (1968) identifies three pressures on which reality judgements are based: the pressure of events, the pressure of other people's schemata or mental models, and the pressure of their internal requirements. Events and internal requirements can be framed in the mental models of involved people. Thus, the essence of any policy would be expressed by surfacing shared mental models. In doing so, policy-making embedded in TQM efforts can encourage people to own core problems as well as the shared understanding towards a common goal of TQM that is to satisfy customers.

Mental models and policy-making

Mental models refer to an array of assumptions, beliefs, images and stories that affect one's viewing and acting (Senge, 1990). Mental models help managers or employees to understand the world around them. Several studies have been undertaken to relate mental models and the activities of the top management team to governing a company. Isenberg (1984) finds the action and thinking of senior managers take place at the same time in control and planning activities that are mostly based on the mental models not the formal models.

The ideas of mental models are central in policy-making (Mason & Mitroff, 1981; Mintzberg, 1977; Morecroft, 1988; Senge, 1990). Morecroft (1988) states that knowledge can be derived from policy-makers' mental models to explain sophisticated phenomena and to build commitment from participants. In this respect, mental models would be important to trace the beliefs and values of policy-makers to understand the problematic situation, the way of defining a kind of intervention that involves other actors, and surfacing and testing policy-makers' assumptions about the managerial work.

A mental models perspective on policy-making relies on the degree of shared beliefs and shared values between policy-makers and organizational members. Shared values impact upon the knowledge of understanding the situation, such as shared definitions and terms and some thrusts among the actors' concern (Eden, 1992). However, it is often difficult to get consensus on some shared values. They often hold a hypothetical or implicit posture which is referred to as 'fragmented values' (Watson *et al.*, 1994). These fragmented values are overcome not by consensus building in a normative sense but by mutual adjustment by dialogue and persuasion which leads to the coordination of action.

Vickers (1968) argues that this mutual adjustment is subjected to appreciative behaviour whereby the complex systems can be analyzed and understood by reality judgement and value judgement. Reality judgement is the process of revealing the state of the system that reflects the actual and hypothetical, past, present and future situation. Value judgement refers to the manner by which one selects the features of these facts that are significant to

organizational life. Moreover, appreciative behaviour demands that it utter assumptions about how reality judgements and values judgements are formed. These assumptions are aimed at gaining mutual understanding about reality in policy-making. The policy-making under appreciative behaviour identifies some subtle policies with their assumptions that are used to enhance knowledge and performance. This can be done by the process of dialogue among policy-makers. The process leads to appreciative policy.

Appreciative policy is constructed through the process of questioning the dominant construction of reality. The basic belief is that people construct reality, and the dominant constructions can be oppressive. Changing the existing structure may be started by creating new mental models that challenge these dominant constructions. Renewed mental models are used as language to account better for the varied experiences and the shared future expectation about organizational life. According to Prahalad and Bettis (1986), these mental models refer to the shared dominant general management logic as the general knowledge structure. Renewed mental models in other studies have different forms, such as based on creating assumptions (Mason & Mitroff, 1981), cognitive maps (Eden, 1992) and schemata (Huff & Schwenk, 1990). Basically, the objective of those studies is to construct underlying concepts of business and explore the impact of change. Policies are then introduced in the realm that the potential results of small changes performed on a small part of a system when amplifying by other variables have a major impact on the overall system. In other words, such policies may be harnessed to leverage performance of the company and to pursue the renewal process in the least disruptive manner (Barr *et al.*, 1992; Senge, 1990).

Appreciative policy and its implementation are closely related. However, appreciative policy may only be continued into action provided mutual expectations can be realized. If this prerequisite cannot be met then these types of policies used to leverage improvement in performance may not achieve the desired effect. This reality is prevalent in organizations since the existence of resistance to change and the failure of linking policies and performance measures with daily operational practice. As a result, excellent policies often bear low performance and are counter-productive during the implementation (Goldratt & Cox, 1992). Hence, besides appreciative policy, another perspective is essential to change renewed mental models into an entire organizational call for action.

Other actors would be involved by integrating new policies and the way they pursue the overall organizational goals, for instance setting the action plan to realize changes. This process of implementing appreciative policy would be termed interactive policy. The term interactive refers to proactive cooperation in operation, communication and shared understanding (Ackoff, 1979, 1981). Interactive policy allows a continuous two-way transfer of information between senior managers' intentions and members' aspiration and also empowers them to counter any managerial constraints in mutual action. Consolidation in processes and mutual commitment for practice are the objectives of interactive policy. By exploring interactive policy, espoused-knowledge and knowledge-in-use are not just aligned together, but it is also possible to create new knowledge for organizational purposes stemming from managing processes (Argyris & Schön, 1978; Luthans *et al.*, 1994).

The concern of policy-makers may be balanced between policy design and how to put policies into practice by showing the complex interaction of constraint constellations. The policy design is the focus of appreciative policy to grasp the situation in attaining an organizational goal more effectively. On the other hand, interactive policy concentrates on the art of making things done or implementation issues for the sake of synergy in advancing a company's performance. In other words, interactive policy is concerned with commitment and actions to elevate constraints and hence to foster the system in pursuing its goal. Table 1 shows the differences between appreciative policy and interactive policy.

Table 1. *Appreciative policy and interactive policy*

Policy resolution	Tool for	Focus on	Objective
Appreciative policy	Leveraging performance	Policy design	Renewed mental models
Interactive policy	Advancing performance	Policy implementation	Commitment and actions

Integrating appreciative and interactive policy would pave the way to improving policies, thus aiding organizations to attain their goals. Leveraging performance in appreciative policy means that policies are used to increase performance by influencing events and relationships as consequences of new supportive policy. Advancing performance in interactive policy is taken to reduce risk by using an unexpected opportunity or situation to advance towards a particular goal because of the existence of commitment and action. Therefore, policy improvement consists of two stages of policy resolution, namely appreciative and interactive policy.

A policy resolution model

Policies depend not only on theories and evidence, but also upon the structure of policy-making bodies and the procedure by which policies are made, implemented and changed (Dunn, 1994). The structure and procedure should provide relevant information to policy-makers to minimize cognitive bias and cultural bias. Moreover, top management teams usually apply mental models in daily decision-making. Taking into account the limitation of rational decision-making, any standard for policy-making bodies should give more prominence to the possibilities of feedback and learning (Hendry, 1995). Therefore, a policy resolution model is needed to examine policy issues and to form policies themselves. The theory of constraints (TOC) is adopted as a language and discipline to provoke generative perspectives in addressing undesirable situations. Therefore, the fundamental reason for choosing TOC to generate the policy resolution is its capability to accommodate naturally human interests to rethinking the current reality and to proposing viable solutions to the complex problem (Goldratt, 1990, 1994; Klein & Debruine, 1995).

TOC is a scientific approach to revealing and elevating constraints in the system. TOC helps policy-makers to identify constraints that prevent the system from achieving its goals and then provides a series of steps which contain cause-effects necessary to make changes in on-going processes. It is possible to combine observation, experience and intuition in examining hidden assumptions about those processes and how to change the construction of reality for a better future (Anderson, 1995; Goldratt & Cox, 1992).

There are three basic assumptions of TOC. The first assumption is that every system must have at least one constraint that can prevent the system from attaining a higher performance relative to its goal (Goldratt & Cox, 1992). Constraints can be defined as anything that limits a system's performance relative to its goal, such as resistance to change, lack of knowledge, markets, outdated policies and population bottlenecks. Most TQM efforts have only a few policy constraints, and it is quite a simple matter to control them (Dettmer, 1995). This first assumption implies that the policy-makers need to determine the global goal and also the measurement to evaluate the efforts, hence identifying that the constraint is possible.

Processes can be understood well by using common sense as an effect-cause-effect explanation. Common sense in the effect-cause-effect explanation is the second assumption of TOC, claimed as the third evolutionary inquiry method after classification and correlation.

Once policy-makers have identified an effect or a problem, they attempt to make an educated hypothesis of the reason underlying the effects, namely the cause. Based on the experiment, they try to find another unrelated effect that can be explained by the cause. If this cause-effect can be proved, then the hypothesis of the first effect-cause becomes a theory. For instance, Goldratt (1990) suggests what he refers to as an 'evaporating cloud diagram' (ECD) to resolve the inherent conflict problem. The effect is to clarify the problem precisely. The hypothesis is to re-examine the foundations of the systems with its hidden assumptions and create a non-compromise solution through using ECD. The core problem is converted to the objective. In order to attain this objective, we must satisfy two different requirements. However, the prerequisite to satisfy one requirement is opposite to the prerequisite of another requirement. Each connection between objective and its requirement is examined, with articulation revealing the hidden assumptions. Injections or interventions are introduced to invalidate the hidden assumptions. In doing so, the core problem evaporate or the problem cannot exist any more. He then goes on to prove the ECD by finding another effect in the production area that is a batch size problem. The hypothesis is once again substantiated in which ECD helps in revealing the conflict and the problem 'evaporates'. As a consequence, ECD can be accepted as a generic knowledge in resolving other conflicting problems.

The third assumption is the importance of participants' buy-in or ownership of the solution in the implementation phase. Ownership of the solution is to permit the participants a voice in deciding what needs to be done and how to do it to implement changes aimed at improving the company performance (Matta *et al.*, 1996). This is referred to as the 'human interest of emancipatory' by Habermas (1974), in which participants take responsibility to initiate and understand their roles in making the changes successful. The aim of achieving participants' buy-in is to ensure that participants become capable of verbalizing their intuition about system complexity and to prove that realities presented are in fact true (Anderson, 1995). Once inherent conflicts are revealed, participants might attain shared understanding through invalidating the erroneous or outdated assumptions and find viable solutions for their own problems. Goldratt (1990) suggests using what he terms the 'Socratic method' to induce participants to possess the process of improvement by finding the solution for themselves in response to a series of directed questions.

TOC itself comprises two focusing processes aimed at identifying core problems, inventing viable solution to the problems and inducing people to implement changes (Goldratt, 1990). The first focusing process is based on the perspective of the system to be improved, namely a five-step focusing process. Using the terminology of the system to be improved, the five-step focusing process is: (1) identify the system's constraints; (2) decide how to exploit the system's constraints; (3) subordinate (align) everything else to the decision in step 2; (4) elevate the system's constraint; and (5) if in the previous steps a constraint has been broken, go back to step 1, but do not allow inertia to cause a system constraint. Andrews and Becker (1992) describe well how this five-step focusing process can be used to improve the operation's performance.

The five-step focusing process is employed by policy-makers to propose the agenda of policy in the system concerned. The agenda contains issues about managerial practice and environmental circumstances that need actual handling for remedying the situation or performance. Concerned issues can be formed in undesired-effect statements that represent mess, unstructured appearance, and inevitable phenomena.

The second focusing process is done through using the terminology of the improvement process. This process involves three steps: (1) decide what to change to pinpoint the core problems; (2) decide what to change to construct simple, practical solutions; and (3) decide how to cause the change to induce the appropriate people to invent the solution. Goldratt

(1994) develops a more rigorous procedure to this second focusing process, named the thinking process.

The thinking process is a step-by-step approach for identifying the underlying causes of undesirable effects and to enable policy-makers to explore the effects of local actions by some actors and decisions on overall system performance (Dettmer, 1995). The thinking process challenges the assumptions behind traditional policies and provides the methodology to define what to change, what it should be changed to, and how to effect change to advance continuously the system performance. The methodology includes current reality tree (CRT), ECD, future reality tree (FRT), Prerequisite tree (PRT) and transition tree (TST). The thinking process can be used to describe the logic of policy-making by exploring the hidden assumptions of policy-makers and justifying the policy content under specific arguments, and also to determine the consequences of policies.

The thinking process is conducted through an intensive dialogue. Dialogue is carried out to mobilize senior managers working on the same agenda to expedite the exposure, refinement and dissemination of new ideas and knowledge. Policy issues usually acknowledge participants (affected and involved people) with their way of perceiving complex problems and proposed solutions, hence dialogue assists them to improve the thought process by focusing on underlying assumptions (Schein, 1993).

The policy resolution model is a valuable tool for devising policies in an organization that consists of both appreciative policy and interactive policy. They are both different in terms of the stage in defining reality and the process to take an action based on the construction of such reality.

Appreciative policy attempts to reveal the picture of reality by merging reality judgements of reality with judgements of value (Vickers, 1968). Reality judgements involve assessment of the facts of a situation, while value judgements narrate the significance of those facts. Hence, value judgements give meaning to the reality judgements. Somehow, the assumptions of describing reality are largely implicit, and consequently are rarely examined, challenged, or questioned. Moreover, each policy-maker has fragmented beliefs about the realities, including the policies. Thus, the current mind-sets need to renew to be the mind-shifts through sharing appreciation of the current organizational practices which are reflected in the agenda and individual learning. In this stage, the making of policy involves continuing dialogue, based on a willingness to question the undesirable effects to determine why the system is sick. This is the answer to the question of what to change. Using the effect-cause-effect method, policy-makers can work out how to construct the cause-effect connections of these undesirable effects and their underlying causes. The origins of this tree are the core problems, which are the outdated policies. Knowledge of this current reality can be represented in the CRT. The CRT contains a series of interconnected undesirable effects (UDEs) and their underlying causes, originating from one or several root causes (outdated policies).

Appreciative policy is used not only to reconstruct the current reality, but also for considering what to change to, i.e. a simple solution or a productive policy. From the CRT, counter-productive policies are revealed. These policies are the constraints in the organization that may emerge from policies which are impairing performance, by impacting negatively on how to deal with limited resources and changeable markets (Dettmer, 1995). The outdated policies must be changed to elevate most of the UDEs or symptoms at one time. ECD is aimed at uncovering the conflicts underneath outdated policies and to resolve them altogether without the need of settling for a compromise solution. Policy-makers use ECD to re-examine the foundations of the system by starting with determining the desired objectives (which are opposite to the core problems) and listing necessary conditions for achieving those objectives. Next one must verbalize the hidden assumptions underneath the requirements and the

prerequisites that must exist in order to achieve the objective. The final step is to verbalize injections that would invalidate one or more of those hidden assumptions and break or change the arrow of the necessary condition of how to achieve the objective. For the time being, policy-makers can take the injections as achieved and then start constructing the FRT.

Policy-makers construct a FRT in search of a viable simple solution to the core problem through replacing an outdated policy with a productive policy. FRT begins with the injections and desired effects or objectives of the solution. Policy-makers then build and scrutinize a FRT to test the proposed solution, again using the effect-cause-effect method. FRT identifies what new policies to change to and also considers their likely impact on the future of the company.

Since ideas are not solutions, policy-makers have to try to verbalize what makes the injection unreal. Negative branch reservation (NBR) is aimed at ensuring that injections are not creating other UDEs. If the communication climate among policy-makers possesses common language, discussion and its derivatives (e.g. devil's advocate, dialectic, and debate) are valid methods that may be applied in constructing a NBR to obtain viable solutions (Schein, 1993). However, to gain ownership and commitment to this viable solution, the approved policies need to be followed up into real processes, whether manifesting themselves as decisions, interventions, or statements. Thus, the execution of policy requires the acceptance of statements, interventions and decisions and the coordination of long-sustained action in organizational practice. It follows the second stage to adjust the appreciative policy, i.e. interactive policy. Interactive policy is devoted to replying to the last question, which is how to cause the change. PRT and TST may help the policy-makers to resolve policy problems in thoughts, communications and building commitments (Goldratt, 1994).

Policy-makers need to identify the obstacles that prevent their injections from being implemented. After identifying the obstacles, policy-makers must determine what must be achieved to overcome that obstacle. This process leads to a series of intermediate objectives. The objectives to implement injections are placed at the top of PRT. In order to achieve injections (main objectives), policy-makers must have intermediate objectives to overcome obstacles. Policy-makers can rearrange the configuration of intermediate objectives on the basis of their time dependency relationships relative to the main objective and the other intermediate objectives to form PRT.

Matching new policies and the processes in real action, including the actors who undertake the processes, is crucial. This stage demands dialogue to make policy-makers conscious of the underlying assumptions whereby different frames and different choices for action emerge. Policy-makers need to convince participants (involved and affected people) that the suggestions to break the conflict will produce desirable effects. In doing so, participants are willing to take ownership of the changed required. Moreover, participants would try to determine the actions necessary to implement the solutions. This action plan is arranged in the TST. The TST aims to attain the intermediate objectives and hence overcome any obstacles. In the TST, all of the intermediate objectives can be attained as consequences of specific actions. Again, the effect-cause-effect method can be used to construct and scrutinize the details of the action plan. As in the construction of the FRT, each step in the TST is scrutinized for negative branches. The transition from counter-productive policies to new productive policies will occur with understanding, ownership (buy-in) and increased warranty of success.

Policy resolution which covers appreciative policy and interactive policy can assist policy-makers to discover areas of mutual interest and to advance the trust building needed to create a learning organization. Dialogue produces the approved policies that pave the way for actors to interact with each other and gain knowledge under well-defined processes. Table 2 summarizes the role of policy resolution to spotlight realities in policy-making.

Table 2. *Spotlighting realities under policy resolution models*

Policy resolution Perspective	A system of concern The system to be improved	Appreciative policy		Interactive policy
		The on-going improvement process		
Question	What is the agenda?	What to change?	What to change to?	How to cause the change?
Technique	Five-step focusing process	Current reality tree	Evaporating cloud and future reality tree	Prerequisite tree and transition tree
Level of reality	Real constraints ↑ Global goal and measurement ↑ Mental models	Core problems ↑ Intermediate effects ↑ Undesirable effects ↑ Mental models	Desired effects ↑ Intermediate effects ↑ Injections ↑ Conflict resolution	Objective and buy-in ↑ Specific action ↑ Obstacles, intermediate objectives

Knowledge acquisition in quality management

Knowledge acquisition is a process of capturing important domain knowledge defined by the policy-makers or the experts for utilization in practice. It is suggested that knowledge acquisition is able to acquire large, highly complex and varied forms of knowledge about the policy-making process. Knowledge, such as declarative, procedural, common sense and heuristic would be processed and presented to be informative knowledge to all organizational members. Knowledge acquisition is also capable of combining knowledge that specifies how beliefs in several pieces of evidence is blended to a single conclusion.

Knowledge acquisition embraces what to believe and what to do with domain knowledge that occurs in the two stages of policy resolution. The first information stems from the dialogue of appreciative policy whereby the construction of realities attempts to reveal in a schema the situation, including its assumptions. In this respect, knowledge acquisition acts as a protocol to record all reasonable beliefs, argumentative structure from the CRT, ECD and FRT. The second source of knowledge is to capture knowledge from the viable policies and the process to realize them through using the PRT and TST. Richardson and Anderson (1995) describe the importance of facilitators that assist the capture of knowledge during the policy-making process. These policy-makers' outputs are converted to systematic knowledge by knowledge representation.

A fundamental obstacle to knowledge acquisition is the representation of knowledge, because usually there is a mismatch between the way that the policy-makers formulate domain knowledge and the way knowledge is represented in implementation. Knowledge representation attempts to mimic the real world in comprehensive features. Knowledge representation replicates the knowledge underlying the cognition of policy-makers through encoding techniques that maintain the forms of that knowledge. It provides the schemes for restoring, retrieval and displaying knowledge.

Knowledge reasoning is used to translate domain knowledge into the action that will be appropriate for operational interpretation. This reasoning process is required to develop shared understanding. Shared understanding refers to organizational structures involving goals, cause-and-effect beliefs and other cognitive elements that are developed through social processes (Lyles & Schwenk, 1992).

The contribution of knowledge acquisition is to make the notation for expressing knowledge more comprehensible and accessible to policy-makers. This knowledge is tapped to enhance insights. Insights can be seen as the creation and revision of a mental model of the domain knowledge and processes within it, and the recognition and evaluation of possibilities, ambiguities, conflicts, paradox and trade-offs inside it. Klein and Debruijn (1995) report how knowledge acquired using the thinking process to scrutinize the counter-productive policies in US companies helped them to compete better in the new environment.

People who practise TQM as a management philosophy should be able to restore the knowledge that can be disseminated across the boundaries of organizational divisions (Luthans *et al.*, 1994). At the end of the day, knowledge acquisition combines the process of restoring and generating knowledge to enable people to interpret and represent it in appropriate ways that reflect the basic principles of policies. The approved policies can be advanced to aid the objective of improved quality by applying this knowledge in real action.

Discussion

Quality management has been evolving for more than two decades. However, the sacrifice in pursuit of improved quality rarely pays off (Brown *et al.*, 1994). Recently, many studies have devoted much attention to questioning assumptions behind quality practice, including the requirement to achieve quality excellence that is suitable for a certain organization (e.g. Brown *et al.*, 1994; Flood, 1993; Goldratt & Cox, 1992). Continuing those studies, this study began with a different perspective, arguing that quality improvement should be coupled with policy improvement. Policy resolution as the process of policy improvement attempts to obtain benefits of quality management by acquiring knowledge and linking this knowledge to operating principles. It implies that employees as participants conduct a learning process to acquire knowledge about TQM in practice and also its potential to attain the company's global goal.

According to Senge (1990) and McGill *et al.* (1992), a generative learning organization possesses the awareness of senior managers to work on obstacles to growth by inducing policies. There is a tendency of resolution of deep problems to gain knowledge and understanding. Hence, this study contributes to resolving managerial problems by performing policy resolution as a complement to the process of quality improvement. It would be accepted that TQM practice with less attention to policy resolution leads to frustration and misunderstanding. To avoid overlooking TQM practice, one needs to bear in mind that TQM is merely a means to achieving an organizational global goal to make money now and in the future (Goldratt & Cox, 1992). Policy resolution would facilitate the focusing process of TOC to guide TQM to attain increased global performance.

Policy resolution is a process to rethink on-going practice, including other changes and future issues, and to appeal to commitment in terms of accountability and contribution of the participants. Policy resolution comprises two stage syntheses, namely appreciative policy and interactive policy, that are adapted from Vickers (1968) and Ackoff (1979, 1981). Appreciative policy strives for meaning in organizational practice and interactive policy seeks consolidation of actors for eliminating constraints in organizational practice.

The two integrative stages (appreciative policy and interactive policy) are merely to link the quest of meaning and the quest of action. This continual flow attempts to accommodate the three human cognitive interests, namely technical interest, practical interest and emancipatory interest, as bases of the search for knowledge (Habermas, 1974). TOC provides generic knowledge to policy-makers to enable them to predict and control managerial practice, which is technical interest. TOC supports the idea of practical interest in which policy-makers can

communicate with each other in the coherent way of thinking to develop shared understanding. Kanter (1992) refers to this style of thinking as kaleidoscope thinking to envision something new and to make a consequent set of actions take place. Finally, emancipatory interest takes place in dialogue among participants. Policy-makers employ PRT and TST as the means to free people from dominating and oppressive power relations in owning the change process.

Srivastva & Cooperrider (1990) epitomize appreciative management as the fresh approach, to learn about reality and how to change that reality. Thus, the tendency of questioning reality is a central theme in previous studies of managerial practice. It can be said that this study provides a new direction to reconstructing reality from current mental models towards renewed mental models of participants, and provides intellectual leadership in revising policy. The framework proposed in this study can also be implemented with the processes of *Hoshin Kanri* (management by policy). Management by policy originated in Japan as a way to implement the plan-do-check-action cycle and to develop a shared understanding of the company's vision in improving processes on the shop floor to satisfy customer and associates (see Suzaki, 1993, for a discussion on the comparison between management by policy and management by objective). Policy resolution guides management by policy through accomplishing two tasks. The first task is to support management policy in focusing on the constraints that inhibit the company from making profits now and in the future, i.e. by using the five-step focusing process. Second, policy resolution provides logic on how the bottom line actions and decisions have a real impact on customer satisfaction.

TQM and policy resolution should be devoted to creating a climate of accountability and self-contribution among the participants in terms of knowledge. This is the ultimate aim of organizational learning to transform the infinity of ignorance to useful knowledge (know how) and understanding (know why). Flood (1993, p. 126) summarizes this feature rigorously in this sentence: 'Securing advantages of quality management can only happen when people have autonomy, responsibility, can participate and are not subject to coercive forces—i.e., when they are free'.

Conclusions

Policies contribute to the alignment of senior managers' intentions and the aspirations of employees. In doing so, policy resolution as a means to improving policy is required to reconstruct reality and propose approved policies to attain overall goals. Current mental models are re-examined and the mechanism of policy resolution is introduced as a deliberate approach to alleviate resistance to change in organizational practice, especially in quality management.

Policy resolution provides a new perspective on understanding organizational learning as the process to advance learning capability through combining policy awareness and organizational practice. It consists of two processes, namely appreciative policy and interactive policy. Appreciative policy intends to transform mental models to gain understanding and knowledge through questioning of dominant construction of reality. Interactive policy is a process of nurturing changes through disseminating shared understanding to gain commitment for real action. By harnessing appreciative policy and interactive policy, policy resolution produces renewed mental models that serve as the drive for change and improvement.

The cognition process in policy resolution can be performed through the use of TOC in critiquing, intriguing and reasoning the process of on-going improvement in TQM. Dialogue and knowledge acquisition can assist policy-makers to create new reality and at the same time appeal to members to act in pursuit of overall organizational goals.

The characteristics of the policy resolution model that has been suggested are: to promote participative policy-making and self-development opportunities for all through dialogue; to encourage policy-makers to surface and test their assumptions about managerial policies through integrating appreciative and interactive policy based on the TOC methodology; and to acquire knowledge as assets for real application in managerial practice. Therefore, learning, knowledge and action cannot separate from organizational learning, including the people who create and apply that knowledge.

An empirical study as an application of the process outlined in this paper is required to show the posture of managerial policies and organizational practice as a mutual process.

Acknowledgement

The authors wish to thank two anonymous referees for their useful comments and suggestions.

References

- ACKOFF, R.L. (1979) Resurrecting the future of operational research, *Journal of the Operational Research Society*, 30, pp. 189–199.
- ACKOFF, R.L. (1981) *Creating the Corporate Future* (New York, Wiley).
- ANDERSON, D.M. (1995) Thinking revolutionary: the amazing Goldratt blazes paths to profit, *Success*, January–February, pp. 40–48.
- ANDREWS, C. & BECKER, S.W. (1992) Alkco Lighting Company and its journey to Goldratt's goal, *Total Quality Management*, 3, pp. 71–95.
- ARGYRIS, C. & SCHÖN, D. (1978) *Organizational Learning: A Theory of Action Perspective* (Reading, MA, Addison-Wesley).
- BARR, P.S., STIMPERT, J.L. & HUFF, A.S. (1992) Cognitive change, strategic action, and organizational renewal, *Strategic Management Journal*, 13, pp. 15–36.
- BROWN, M.G., HITCHCOCK, D.E. & WILLARD, M.L. (1994) *Why TQM Fails and What to Do about It* (Illinois, Irwin).
- DETTMER, H.W. (1995) Quality and the theory of constraints, *Quality Progress*, April, pp. 77–81.
- DUNN, W.N. (1994) *Public Policy Analysis: An Introduction*, 2nd Edn (Englewood Cliffs, NJ, Prentice Hall).
- EDEN, C. (1992) On the nature of cognitive maps, *Journal of Management Studies*, 29, pp. 261–265.
- FLOOD, R.L. (1993) *Beyond TQM* (Chichester, Wiley).
- GOLDRATT, E.M. (1990) *What is this Thing Called Theory of Constraints and How should it be Implemented?* (New York, North River Press).
- GOLDRATT, E.M. (1994) *It's Not Luck* (New York, North River Press).
- GOLDRATT, E.M. & COX, J. (1992) *The Goal: A Process of Ongoing Improvement*, 2nd Edn (New York, North River Press).
- HABERMAS, J. (1974) *Theory and Practice* (London, Heinemann).
- HENDRY, J. (1995) Strategy formation and the policy context, *Journal of General Management*, 20, pp. 54–64.
- HUFF, A.S. & SCHWENK, C. (1990) Bias and sensemaking in good times and bad. In: A.S. HUFF (Ed.) *Mapping Strategic Thought* (Chichester, Wiley), pp. 89–108.
- ISENBERG, D.J. (1984) How senior managers think, *Harvard Business Review*, 62(6) November–December, pp. 81–90.
- KANTER, R.M. (1992) *The Change Masters: Corporate Entrepreneurs at Work* (London, Routledge).
- KLEIN, D.J. & DEBRUINE, M. (1995) A thinking process for establishing management policies, *Review of Business*, 16, pp. 31–37.
- LUTHANS, F., HODGETT, R.M. & LEE, S.M. (1994) New paradigm organizations: from total quality to learning to world class, *Organizational Dynamics*, 22, pp. 5–19.
- LYLES, M.A. & SCHWENK, C.R. (1992) Top management, strategy and organizational knowledge structures, *Journal of Management Studies*, 29, pp. 155–174.
- MASON, R.O. & MITROFF, I.I. (1981) *Challenging Strategic Planning Assumptions* (New York, Wiley).
- MATTA, K., DAVIS, J., MAYER, R. & CONLON, E. (1996) Research questions on the implementation of total quality management, *Total Quality Management*, 7, pp. 39–49.

- MCGILL, M.E., SLOCUM, J.W. & LEI, D.T. (1992) Management practices in learning organizations, *Organizational Dynamics*, 21, pp. 5–17.
- MINTZBERG, H. (1977) Policy as a field of management theory, *Academy of Management Review*, 2, pp. 88–103.
- MORECROFT, J.D.W. (1988) System dynamics and microworlds for policy makers, *European Journal of Operational Research*, 35, pp. 301–320.
- PRAHALAD, C.K. & BETTIS, R.A. (1986) The dominant logic: a new linkage between diversity and performance, *Strategic Management Journal*, 7, pp. 485–501.
- REDMAN, T. (1995) Is quality management working in the UK?, *Journal of General management*, 20, pp. 45–59.
- RICHARDSON, G.P. & ANDERSON, D.F. (1995) Teamwork in group model building, *System Dynamics Review*, 11, pp. 113–137.
- SARAPH, J.V., BENSON, P.G. & SCHROEDER, R.G. (1989) An instrument for measuring the critical factors of quality management, *Decision Sciences*, 20, pp. 810–829.
- SCHEIN, E.H. (1993) On dialogue, culture, and organizational learning, *Organizational Dynamics*, 22, pp. 40–51.
- SENGE, P.M. (1990) *The Fifth Discipline: The Art and Practice of the Learning Organization* (New York, Doubleday Currency).
- SRIVASTVA, S., COOPERRIDER, D.L. (Ed.) (1990) *Appreciative Management and Leadership: The Power of Positive Thought and Action in Organizations* (San Francisco, Jossey-Bass).
- SUZAKI, K. (1993) *The New Shop Floor Management: Empowering People for Continuous Improvement* (New York, The Free Press).
- VICKERS, G. (1968) *Value Systems and Social Process* (London, Tavistock Publications).
- WATSON, R.T., BOSTRAM, R.P. & DENNIS, A.R. (1994) Fragmentation to integration. In: P. LLOYD (Ed.) *Groupware in the 21st Century: Computer Supported Cooperative Working Toward the Millennium* (Wesport-Connecticut, Preager).