A RESEARCH DESIGN TO STUDY ORGANIZATIONAL INNOVATIVENESS:
TQM IMPLEMENTATION AT A SINGLE HOSPITAL

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ABSTRACT

This paper proposes a research design using three methods to examine Total Quality Management (TQM) implementation as an organizational innovation at a single hospital. The proposal to study TQM implementation is mainly quantitatively oriented. However, the paper also advocates a configurational analysis to provide a richer characterization of the innovation adopters. Lastly, the study recommends a qualitative analysis of interviews with a sample of non-supervisory hospital employees regarding the predictor variables. The three methods determine how internal characteristics of organizational structure relate to the degree and time of TQM adoption by a hospital’s departments. These organizational factors include centralization, complexity, formalization, interconnectedness, organizational slack and size. A framework of 12 propositions is described to explain the six organizational factors and their expected relationship with organizational innovativeness.

The statistical analysis, configurational analysis, and qualitative analysis use a hospital department as the unit of analysis. Proposed data collection methods include a survey, management and non-supervisory interviews, and archival documents provided by the hospital. The configurational analysis depicts the structural characteristics of the current adopter departments in a dependent variable oriented matrix. The qualitative analysis suggests the development of a codebook created from the non-supervisory interview data.
This paper proposes a research design using three methods to examine Total Quality Management (TQM) implementation as an organizational innovation at a single hospital. The proposal to study TQM implementation is mainly quantitatively oriented. However, the paper also advocates a configurational analysis to provide a richer characterization of the innovation adopters. Lastly, the study recommends a qualitative analysis of interviews with a sample of non-supervisory hospital employees regarding the predictor variables. The three methods determine how internal characteristics of organizational structure relate to the degree and time of TQM adoption by a hospital’s departments. These organizational factors include centralization, complexity, formalization, interconnectedness, organizational slack and size. A framework of 12 propositions is described to explain the six organizational factors and their expected relationship with organizational innovativeness.

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The three part methodology attempts to reconcile the intersection of two older yet prominent organizational innovation theories with more current literature on organizational innovation. The theoretical assertion is made that a mechanistic organization is the apex of convergence between two fundamental theories of organizational innovativeness, dual-core theory and ambidextrous theory while the more recent research suggests a hybrid model. Therefore, the two central questions of the proposed study are “What configuration of
organizational factors facilitates organizational innovativeness?” and “What is the best characterization of this configuration; mechanistic, organic, or a hybrid of the two?” The knowledge gained about TQM practices will enable the design of and participation in more innovative health care methods that will result in improved patient care in hospitals.

**TQM IN HEALTHCARE**

Perhaps the best way to gain an understanding of TQM’s integral composition is to consider what the pioneers of TQM cite as the salient interventions of this management philosophy (See Dean & Bowen (1994) for an overview of TQM principles, practices, and techniques.) Hackman and Wageman’s (1995) distillation of the contributions by W. Edwards Deming, Joseph Juran, and Kaoru Ishikawa articulate five interventions to which all TQM writings are linked and include 1. explicit identification and measurement of customer requirements; 2. creation of supplier partnerships on the basis of quality; 3. use of cross-functional teams to identify and solve quality problems; 4. use of scientific methods to monitor performance and to identify points of high leverage for performance improvement; and 5. use of process-management heuristics to enhance team effectiveness.

Healthcare organizations first adopted TQM in the late 1980s mainly in response to pressure from employers, purchasers, and payers to offer more cost-effective healthcare (Berwick, Godfrey, and Roessner, 1989, 1990: Laffel and Blumenthal, 1989). A large-scale demonstration project sponsored by private health care foundations resulted in widespread diffusion in 1989 (Berwick, Godfrey, and Roessner, 1989). Total Quality Management is now the driving force behind the efforts of health care organizations to meet the Joint Commission on the Accreditation of Healthcare Organizations’ accreditation requirements (Westphal, Gulati and Shortell, 1997). Receipt of an acceptable compliance score from JCAHO holds significant
importance as it allows hospitals to participate in the Federal Medicare Program and many state Medicaid programs (Scott, 1987). Adoption of a TQM program is the principal way that a hospital shows its ongoing commitment to accommodate customers by providing quality health care while minimizing waste through the application of a portfolio of techniques and practices.

JCAHO requires hospitals to measure and evaluate their operations while demonstrating continuous quality improvement. Interestingly, according to the president of JCAHO “If there was ever any organization that needed a quality improvement initiative, it was the Joint Commission” (O’Leary, 1992: 2). So, JCAHO has become a TQM champion for their own organization and for healthcare organizations in general. JCAHO even sponsors the Ernest E. Codman award for excellence that is given to those organizations and individuals showing leadership in continuous quality improvement.

The majority of U.S. organizations (Conference Board, 1991) delivers a first round of training to senior level managers and then employs subsequent cascading training events given by the trained managers who in turn train staff at one level lower. Their approach generally includes content items such as interpersonal skills, quality-improvement processes and problem-solving, team leading and building, running meetings and statistical analysis. Most U.S. organizations give their non-management employees eight hours of training (Conference Board, 1991). Implementing training is one of Deming’s (1986) 14 points and learning is a concept that underscores the TQM approach (Anderson, Rungtsanatham, & Schroeder, 1994; Sitkin, Sutcliffe, & Schroeder, 1994).

While an organization may have previously tried other similar performance improvement techniques, it should be noted that past failed attempts at implementing administrative innovations have not shown to be a stumbling block in implementing new initiatives in hospitals
(Counte, 1988). However, some organizations abbreviate the program’s name to “Quality Management” or “Quality Improvement” after vocal participants object to the term “total” due to its connotation of being an all inclusive system that is too controlling or constricting. This is consistent with some postmodern researchers who deconstruct TQM and question the “totalizing narrative” (Steingard & Fitzgibbons, 1993, 28) that TQM implies.

Although the results of TQM implementation in general have been mixed (Zbaracki, 1998), there have been sizable financial returns for hospitals (Sherer, 1994). Further, research has shown that process improvements in hospital settings can result in improved customer satisfaction and improved efficiency (Carman et al, 1996). Most notably, recent research on 193 hospitals has confirmed a positive relationship between the degree of implementing TQM practices and overall organizational performance (Douglas & Judge, 2001).

**DUAL-CORE AND AMBIDEXTROUS THEORIES OF INNOVATION**

An innovation is defined as “any idea, practice or material artifact perceived to be new by the relevant unit of adoption” (Zaltman, Duncan, and Holbek, 1973: 158). The dual-core theory distinguishes between administrative and technical innovations (Daft, 1978). This distinction becomes important when positioning TQM as a specific type of organizational innovation for study in a hospital. Damanpour et al (1989) inform that the adoption of administrative innovations leads to adoption of technological innovations and state criteria to elucidate the differences between these two innovation types.

“Administrative innovations are defined as those that occur in the administrative component and affect the social system of an organization. The social system of an organization consists of the organizational members and the relationships among them. It includes those rules, roles, procedures, and structures that are related to the communication and exchange between organizational members. Administrative innovations constitute the introduction of a new management system, administrative process, or staff development program. An administrative innovation does not provide a new product or a new service, but it indirectly
influences the introduction of new products or services or the process of producing them.

Technical innovations are defined as those that occur in the operating component and affect the technical system of an organization. The technical system consists of the equipment and methods of operations used to transform raw materials or information into products or services. A technical innovation, therefore, can be the adoption of a new idea pertaining to a new product or service, or the introduction of new elements in an organization’s production process or service operations.”

From the definitions, one can see that total quality management meets the Damanpour et al (1989) criteria of an administrative innovation. Likewise, Dean and Bowen (1994) define TQM as a managerial innovation stressing organizational commitment to the customer and continuous improvement with scientifically gathered data by empowered employee groups who use problem-solving techniques.

Ambidextrous theory (Duncan, 1976) is used to differentiate between innovation adoption stages. Under this theory, pre-adoption activities are considered to fall into the initiation stage and consist of problem perception, information gathering and attitude formation and evaluation leading to adoption (Damanpour & Gopalakrishnan, 1998). However, this study suggests the implementation stage as the reference point. This stage includes innovation and organization modifications and initial and routinized use of the innovation (Damanpour & Gopalakrishnan, 1998). The initial use of the implementation stage choice fits with the extent or degree of use measure for organizational innovativeness suggested for this study because the TQM program is studied during implementation.

MECHANISTIC VERSUS HYBRID ORGANIZATIONAL STRUCTURE

Max Weber (1947) characterizes the ideal organizational form as one with a clear division of labor, specified hierarchy of authority for decision making, and formal rules and procedures. It is this orderly and fair structure that Burns and Stalker (1961) refer to as a
mechanistic organization where work is specialized into differentiated functions, where the means are more important than the ends, and where interactions are largely vertical between superior and subordinate. In contrast to the mechanistic design that thrives in a stable environment, the freer flowing organic structure operates best in more dynamic circumstances.

The mechanistic organization may well represent the apex of convergence for organizational factors, referred to by Damanpour and Gopalakrishnan (1998) as existing between dual-core theory and ambidextrous theory for administrative innovations. However, more recent research (Shea & Howell, 1998) suggests that for TQM implementation, the desired organizational structure balances the need for control of activities with the flexibility needed to respond and adapt quickly to changing customer needs. Sitkin, Sutcliffe, and Schroeder (1994) articulate the need for an approach to TQM that involves exploration and learning while subsequent researchers (Eisenhardt & Tabrizi, 1995; Sutcliffe, Sitkin, & Browning, 1999) build on these findings to assert the need for balancing both control and learning within an organization. Most recently, Douglas and Judge (2001) found this balance to be a moderator where control and exploration worked synergistically together to enhance the relationship between TQM implementation and financial performance.

METHODS

Assessing Organizational Innovativeness Dependent Variables

Two measures can be used to measure organizational innovativeness, namely, degree or extent of implementation and time of implementation in the context of varying hospital departments. Downs and Mohr (1976) point out that these two measures are superior to the crude and simple binary measure of adoption or nonadoption and better account for variation in adoption. However, they caution researchers to “conceive of the two operationalizations as two
different behaviors to be explored, not because they are invariably independent of one another but because of the need to avoid biased, muddled generalizations” (Downs & Mohr, 1976: 710). Recent research supports this approach. For example, Ravichandran (2000) used two measures of TQM adoption in information systems that were conceptually similar to this study, namely, “swiftness” or earliness of adoption and “intensity” or relative completeness of adoption.

This paper suggests studying organizational innovativeness by using one innovation, namely, TQM in one organization. Subramanian (1996) proposes a multidimensional measure of innovativeness consisting of the time of innovation adoption, the number of innovations adopted and the consistency of time of adoption. However, Damanpour (1991) indicates that studies of single innovations are essential to determine how innovations develop over time in organizations. Mohr (1982) refers to such studies as “process” research. Meyer and Goes (1988, 901) even suggest “avoiding the aggregation of data across innovations, organizations, or time, unless theoretical justifications exist for doing so.” Studying TQM at one hospital is offered in remedy for the following situation.

“Researchers who construct innovativeness scores by adding nominally measured adoptions remove specific innovations from their social contexts, ignore pre and post-adoption events, and raise the level of analysis in ways that are rarely acknowledged. They measure an aggregate construct-adopting lots of different innovations. But when the utilization of specific innovations is not assessed, their ultimate effects are obscured (Meyer and Goes, 1988, 900).”

Degree of implementation. Considering that only four percent of the 99 papers published in academic and practitioner journals between 1989 and 1993 about the effects of TQM assessed the degree to which TQM interventions actually were in place, the importance of furthering this work becomes evident (Hackman and Wageman, 1995). The TQM interventions from Hackman and Wageman (1995) form the basis of measuring the degree of TQM adoption. If all five criteria are demonstrated then TQM is fully in place at the particular hospital department.
A binary process is suggested to score the implementation of the TQM interventions using the management interview data. The indicator is deemed demonstrated if the researcher can identify tangible efforts made by the department head, senior leader, or CEO regarding each TQM intervention. Then a composite scale is created from the average of the five binary indicators. Therefore, for example, if a department demonstrates that they have done three of the five interventions, their degree of implementation score is 60%. This binary approach is consistent with Duncan’s (1976) early conceptualization of innovation adoption and more recently Cooper and Zmud’s (1990) stage model. Further, it reflects the method of operationalization for innovation adoption in empirical work for information systems (Zmud, 1982; Nilakanta & Scamell, 1990; Rai & Patnayakuni, 1996). Most recently, Ravichandran (2000) operationalized TQM adoption of a cluster of ten quality-oriented practices as the “...proportion of these practices that have been adopted. Whether a practice has been adopted or not, and not the degree to which it has been implemented, formed the basis for computing the intensity of adoption.”

The first intervention, “explicit identification and measurement of customer requirements,” is measured by determining whether the department head interviewed by the researcher states that efforts were made to determine the identity of their customers and their customers’ requirements. The researcher would ask interviewees how customers and their requirements were determined and request copies of any supporting documentation. Continuing efforts to satisfy this first indicator are also reviewed with the parties interviewed.

It should be noted that the purview of this intervention includes both internal and external customers. Internal customers refer to those employees interacting with the individual who is being interviewed and works inside the hospital. An internal customer can be someone in the
same department or in another department. External customers refer to those persons interacting with the individual who is being interviewed and works outside the hospital. It is recognized that not every employee will have external customers.

The “creation of supplier partnerships on the basis of quality” is the second TQM intervention. In the same way as for the first indicator, information regarding efforts to develop a quality supplier partnership would be secured from those interviewed. The researcher would ask interviewees for copies of any supporting documentation. Continuing efforts to develop supplier relationships would be reviewed with the parties interviewed.

The third intervention is the “use of cross-functional teams to identify and solve quality problems.” If a department has actually used a cross-functional team then they are assessed as meeting this criterion. The department head needs to identify the team members, their task and the first meeting of the team that took place to satisfy the criterion. If applicable, it is determined if evidence of a team charter is available that is signed by a senior leader and outlines the team’s purpose, responsibilities and timeframe. Alternatively, if a meeting is set for some time in the future or plans are only being considered, then this indicator is not met.

For the next intervention, “use of scientific methods to monitor performance and to identify points of high leverage for performance improvement,” the department needs to show what methods are being used and how they are being used. An example is a control chart that establishes upper and lower variance limits for some departmental process. A long history of use is not required but clear evidence is necessary that scientific methods were being used.

The last intervention, “use of process-management heuristics to enhance team effectiveness,” includes a flow chart that maps out processes for analysis and improvement, brainstorming to creatively and efficiently generate a high volume of ideas or any of several
other techniques from the TQM training session or elsewhere. To satisfy this indicator, evidence of using a TQM technique is required. While the researcher would accept verbal statements from the person interviewed regarding the veracity of his or her claim, it is to obtain documents such as minutes to a meeting, or the actual TQM technique documents used.

Time of implementation. The second measure of organizational innovativeness is the time of implementation. This is a common measure in assessing how early a unit is in adopting new ideas relative to other members of a system (Subramanian, 1996, Subramanian & Nilakanta, 1996, and Rogers, 1995). Members in a social system do not adopt an innovation at the same time. This is especially true for administrative innovations. Although the management philosophy of TQM may be consistent, the content or form of adoption is open to interpretation, implying that certain organizational factors may affect the development and implementation of TQM in varying departments for the same organization (Westphal, Gulati, & Shortell, 1997).

For the hospital study, benchmark start and end dates of the TQM program need to be selected. They serve as common points for the dependent variable’s measurement. The researcher would record time units in days. Interviewees would be asked to place each TQM intervention that was implemented on a timeline from February 11, 1999 (pseudo start date) to June 26, 2000 (pseudo end date) when they are explaining the extent of implementation for the department. This then yields a temporal domain of 502 days using these artificial dates. Therefore, a possible departmental could be implementation of TQM intervention number three on June 15, 1999; number five on June 30, 1999; and number four on January 15, 2000.

Interpretation of this departmental example yields the extent of TQM adoption as 60% (three out of five TQM interventions) in 338 days. The most innovative department will be the one with the greatest degree of implementation in the shortest time period. If two departments
have the same degree of implementation, the one with the shortest length of time to achieve that level of implementation will be deemed more innovative. So, in comparison to the above example, if a second department’s degree of adoption is 60% but this was achieved in 400 days it will be found less innovative than the first department.

Another possible outcome serves to further clarify subsequent data analysis. If a third department’s degree of implementation is 80% but it is achieved in 450 days, then this department will be identified as the most innovative. This finding will be maintained even if the third department took longer to reach the 60% implementation mark than either of the other two departments. Therefore, I am suggesting that the extent of implementation has primacy over the length of time it takes to achieve a given level of implementation. However, all data would be analyzed to optimize learning insights.

Downs and Mohr (1976, 709-710) support this approach when there is variation in the method of implementation, “operationalizing innovation by the extent of implementation comes closer to capturing the variations in behavior that we really want to explain...In the cases where such variation is possible, it is frequently this variation rather than time of first usage that we would like to account for.” Administrative innovations are inherently subject to more variation than technological innovations (Pelz & Munson, 1982). With respect to TQM implementation, Hackman & Wageman (1995) state that there are some divergences in contemporary practice from the central themes of the movement’s founders, as they find less use of scientific methods of data gathering and more emphasis on group-process techniques and interpersonal skills.

ORGANIZATIONAL FACTORS AND PROPOSITIONS

Antecedents of organizational innovativeness can be measured in terms of individual (leader) characteristics, internal characteristics of organizational structure or by external
characteristics of the organization (Rogers, 1995 and Fleisher, et al, 1995). I choose to use the
second measurement, also called organizational factors which some authors claim have been the
most widely studied and are the primary determinants of innovation (Damanpour, 1991; p. 557).
This represents a choice point, as each of these measurement approaches can reasonably
constitute a separate conceptual inquiry.

For instance, an equally broad avenue of discovery is related to the external environment,
where writers compare the natural selection model versus the resource dependence model, for
instance (Aldrich & Pfeffer, 1976). Duncan (1972) defines an organization’s environment to
include physical and social factors critical to success that are outside organizational parameters.
An organization’s attunement with its environment is necessary for long-term sustainability
(Thompson, 1967). However, an exogenous examination of a hospital naturally leads to a
comparative analysis of the internal organizational characteristics investigated in this paper and
thus would be better suited for subsequent independent inquiry where multiple organizations in
contrasting environments are investigated.

There are six organizational factors referred to in the literature on organizational
innovativeness, namely: centralization, complexity, formalization, interconnectedness,
organizational slack, and size. I have not uncovered any single study that included all six
organizational factors as independent variables. For example, some writers only investigate size
as an independent variable (Kimberly, 1976 and Damanpour, 1992). Other studies only pick two
variables to investigate such as size and centralization (Moch, 1977).

In the sections that follow, Rogers (1995) is used to explain five of the six independent
variables while Damanpour (1991) is used to define size. I offer two propositions for each
organizational factor as it relates to TQM implementation in the departments of a hospital. Seven
of the propositions would test the extent to which a mechanistic organizational structure is best suited for innovation implementation. Support for this direction comes from the novelty of examining the intersection of dual core theory and ambidextrous theory. Where suggested by the relevant literature, five hypotheses are stated that represent a more organic organizational structure. Therefore, the result is a hybrid proposition framework of organizational factors.

Centralization

Centralization is the first organizational factor and is the most salient structural variable when analyzing organizational design (Marsden, Cook, & Knoke, 1994). It generally refers to the location of decision making and the number of parties involved in the decision making process (Rogers, 1995). Rogers (1995, 379-380) defines centralization as “…the degree to which power and control in a system are concentrated in the hands of relatively few individuals. Centralization has usually been found to be negatively associated with innovativeness; that is, the more that power is concentrated in an organization, the less innovative the organization tends to be.”

This seems to make intuitive sense, as individuals who start innovations want to have the freedom to span boundaries and not be too tightly constrained by higher-level authorization requirements. Therefore, the initiation of innovations is more frequent in a decentralized organization. Although decentralization may facilitate initiation, the regiment of centralization, as found in a bureaucracy, assuages implementation concerns. Simon (1997, 317) notes “…centralization of decision making serves three purposes: it secures coordination, expertise, and responsibility.” There is a consensus in the literature that centralization is important in a theoretical sense despite variance in findings that generally suggest its relationship with innovation adoption is positive in studies with administrative innovations and negative in studies
with technical ones (Kimberly & Evanisko, 1981). This is analogous with dual core theory (Daft, 1978) that suggests administrative innovations are top-down driven whereas technical innovations are bottom-up processes. The underlying theme in the literature is that centralization is a key predictor in the innovation process and the direction of the relationship is dependent on innovation type. Proposition 1a and proposition 1b below represent the general indication of the literature on centralization and innovation based on the rationale that high levels of centralization would streamline the innovation implementation process (Kimberly & Evanisko, 1981).

Proposition 1a. Centralization is positively associated with the degree of TQM implementation.

Proposition 1b. Centralization is negatively associated with the length of time required for full TQM implementation.

Complexity

Complexity is the second organizational factor expected to influence TQM implementation. It is defined by Rogers (1995, 380) as

“...the degree to which an organization’s members possess a relatively high level of knowledge and expertise, usually measured by the members’ span of occupational specialties and their degree of professionalism expressed by formal training. Complexity encourages organizational members to conceive and propose innovations, but it may make it difficult to achieve consensus about implementing them.”

Achieving consensus can take more time than other forms of decision making. In an organization with highly trained and specialized employees, multiple and conflicting views will be brought to bear on an issue and thereby extend the time needed to take action on it.

Propositions 2a and 2b below represent the general indication of the literature on complexity and innovation (Aiken & Hage, 1971; Corwin, 1972; Hage & Aiken, 1967; Mytinger, 1968) based on the rationale that lengthy consensus building may also jeopardize full implementation.
Proposition 2a in particular, is supported by Daft’s (1978, 207) findings in his study of school districts in that “Low professional districts, which have tighter coupling and a dominant administrative core, tend to adopt more administrative innovations.”

**Proposition 2a.** Complexity is negatively associated with the degree of TQM implementation.

**Proposition 2b.** Complexity is positively associated with the length of time required for full TQM implementation.

**Formalization**

Formalization is the third organizational factor and is defined by Rogers (1995, 380) as “…the degree to which an organization emphasizes following rules and procedures in the role performance of its members. Such formalization acts to inhibit the consideration of innovations by organization members, but encourages the implementation of innovations.”

Like centralization, formalization is relatively transparent in organizations. The literature on formalization (Rogers, 1995) generally conceives of it as the written and observed workplace rules and roles. This is typically manifested in organizations as written job descriptions, organization charts, and performance appraisals. Innovation scholars (Evan & Black, 1967; Ettlie, Bridges, & O’Keefe, 1984) have emphasized the need for a clearly articulated and firm purpose along with specific work rules for organizational innovation. More recent meta-analytic results (Damanpour, 1991) were unable to reject the positive relationship between formalization and innovation implementation.

Weber (1947) conceptualizes these features of formalization to include the hierarchical body of laws or rules that operate in an organization such that every employee is subject to an impersonal order that guides his or her actions and each employee has a predetermined domain
of competence, with obligations, authority, and powers to compel obedience. Therefore, Proposition 3a and proposition 3b reflect that while a formal organization may take longer to implement an innovation than a less formal one; it may be more likely to achieve full implementation.

Proposition 3a. Formalization is positively associated with the degree of TQM implementation.

Proposition 3b. Formalization is positively associated with the length of time required for full TQM implementation.

Interconnectedness

Interconnectedness is the fourth organizational factor anticipated to affect TQM implementation at a hospital. It is defined by Rogers (1995, 381) as “…the degree to which the units in a social system are linked by interpersonal networks. New ideas can flow more easily among an organization’s members if the organization has higher network interconnectedness.” The researcher is using interconnectedness here to mean the extent of interpersonal relationships among employees outside their respective hospital departments. Therefore, a department is more interconnected when its employees participate in interdepartmental training and meetings, share equipment with other departments, help employees from other departments, and share break time with employees from other departments. The organizational innovation literature supports the adoption of an innovation by increasing the amount and diversity of information moving through an organization (Hage & Aiken, 1967, Kimberly, 1981, Fennell, 1984).

However, that same pathway of connection may become a bottleneck when it comes time to operationalize an innovation. Communication channels that are no longer pertinent to the task of implementation may impede the advantages of parsimonious dialogue. To try to explain this,
Ravichandran (2000) suggests that there is less analysis conducted when determining the suitability of an administrative innovation than is undertaken for a technical innovation possibly due to the difficulty in clearly understanding the benefits of an administrative innovation. Interestingly, Ravichandran (2000) did not find a significant positive relationship between the swiftness of TQM adoption among information systems departments and diversity of information exchange but he did find such an information flow to be significantly and positively related to the intensity of adoption. Therefore, it is postulated that a high level of interconnectedness may result in full implementation. However, because of possible extraneous dialogue ensuing with increased interconnectedness, the time of implementation may be longer with a high level of interconnectedness than that which may occur with a low level of interconnectedness as in a more mechanistic organization with hierarchically determined interaction patterns (Burns & Stalker, 1961). This particular variable is somewhat unique to TQM as an innovation and perhaps especially so in comparison with other administrative innovations.

Because TQM often goes outside departmental walls in order to be effective, interconnectivity is implied. So, it could be expected that in order for an innovation to be fully implemented a department must be highly interconnected with other departments. Proposition 4a and proposition 4b relate to the foregoing logic. Departmental boundary spanning is necessary to identify problems, look for improvement opportunities, and identify possible solutions.

Proposition 4a. Interconnectedness is positively associated with the degree of TQM implementation.

Proposition 4b. Interconnectedness is positively associated with the length of time required for full TQM implementation.
Organizational Slack

The fifth organizational factor is organizational slack and is defined by Rogers (1995, 381) as “...the degree to which uncommitted resources are available to an organization.” Such uncommitted resources can be either financial or personnel and suggest a certain opportunistic deployment as the situation demands. It in fact follows contingency theory by allowing resource flexibility in a system to take advantage of ideas and act quickly on their development. If all resources are fully utilized then it is conceivable that an organization does not have the capacity to innovate.

A positive and statistically significant relationship found between organizational slack and the degree of implementation would be consistent with the relevant literatures on innovation implementation and organizational slack (Damanpour, 1991). However, there has been an ongoing debate regarding how slack should be measured (Bourgeois, 1981), its antecedents (Sharfman, Wolf, Chase & Tansik, 1988) and finally whether slack is good or bad for innovation (Nohria & Gulati, 1996). Recent research (Nohria & Gulati, 1995) suggests that an inverse U-shaped relationship exists between slack and innovation thereby indicating an optimum amount of slack for innovation implementation. Despite the foregoing, a meta-analysis of research on the determinants of innovations found slack resources to be a stable factor across studies (Damanpour, 1991).

One can relate the organizational slack variable to the findings of Cohen and Levinthal (1990) on the positive relationship between Research and Development (R&D) investment and a firm’s “absorptive capacity” measured by its ability to recognize the value of new information, to understand it and to commercialize it. A high R&D investment facilitates absorptive capacity.
Propositions 5a and 5b address the proposition that organizational slack permits full and early TQM implementation.

Proposition 5a. Organizational slack is positively associated with the degree of TQM implementation.

Proposition 5b. Organizational slack is negatively associated with the length of time required for full TQM implementation.

Size

Size is the final organizational factor predicted to influence TQM implementation. An early study of organizational size that considers 80 empirical studies conducted between 1950 and 1974 concludes that the construct has been too loosely defined to be properly understood (Kimberly, 1976). However, since then this variable has been well supported by the literature to have an impact on innovation implementation beginning with Moch and Morse’s (1977) early work on hospitals that suggested a positive relationship. Subsequent research (Damanpour, 1987) showed that size had even a greater influence on the implementation of administrative innovations than technical innovations. Damanpour’s (1992) later research found that size is more strongly related to the implementation than to the initiation of innovations in organizations. Finally, in a meta-analysis of 23 empirical studies, 21 articles, and two books, Damanpour (1991) found a positive relationship between size and innovation.

Given Damanpour’s (1987, 1991, and 1992) findings, proposition 6a reflects positively with the extent of TQM implementation. The basis of this rationale may just be economies of scale that improve the likelihood of adoption (Moch & Morse, 1977). However, proposition 6b proposes that size will be positively related to the length of time required for full TQM implementation at a hospital department like the independent variables of complexity,
formalization, and interconnectedness. This is because a large organization should take longer to implement an innovation than a smaller one due to increased requirements for communication, coordination, and influence gathering (Damanpour, 1992).

Proposition 6a. Size is positively associated with the degree of TQM implementation.

Proposition 6b. Size is positively associated with the length of time required for full TQM implementation.

The above reflects a hybrid distribution of propositions between a mechanistic and an organic structure. For instance, this distribution reflects the positive relationship between centralization and the degree of implementation (proposition 1a) characteristic of a mechanistic organization and the negative relationship between organizational slack and the time of TQM implementation (proposition 5b) representative of an organic organization.

PROPOSED ANALYSIS

The unit of analysis for the study would be at the department level as determined by budget code structures at the hospital. This approach is supported by research (Carman et al, 1996) that suggests the use of a unit of analysis smaller than the hospital because the impact of continuous quality improvement typically takes over four years. Given that the hospital study is suggested to be conducted during the implementation phase, it is reasoned that more readily observable progress toward complete implementation would occur at the departmental level.

Statistical Analysis

The data collection process consists of multiple methods including a survey, interviews with management representatives and non-supervisory employees, and a review of archival data from the hospital. Non-supervisory interviews are explained in the qualitative analysis section. The following sections describe the population to be surveyed, survey sample, data collection
methods, and the study’s measures. Multiple regression analysis would be used to test the relationships between the independent variables or organizational factors and the degree and time of innovation implementation.

Establishing the population. Due to the unit of analysis being at the department level, the total population of employees was surveyed. This is particularly appropriate, as the population size for some departments may be quite small. Although Neuman (2000:208) supports a random stratified sample in such cases and states “In general, stratified sampling produces samples that are more representative of the population than simple random sampling if the stratum information is accurate,” the resulting sample population will not ensure any more meaningful statistical results.

A list of the number of employees per department could be obtained from the hospital’s Human Resources Department. Employees on the list would be categorized as “actual” and include individuals occupying positions. It would not include “authorized” but vacant positions. This effectively means a “warm-body” count that excludes employees on long-term leaves of absence. Further, seasonal and contract workers would not be included in the survey due to the short and tenuous nature of their employment. Therefore, the term “employees” is used to include people working on a full-time and part-time basis.

Survey. A survey of all actual hospital employees would be used to assess their perceptions of all organizational factors, except size, as they exist within their respective departments. The researcher would first work with a small team of selected TQM trainers at the hospital to obtain an informal review of the survey’s language and to consider adjustments that they recommended. Next, the researcher would pilot test the survey with a group of volunteers at a nearby hospital within the same system, if possible, to determine the approximate time required
to complete the survey and again reconsider the language used to ensure that it will be comprehensible by employees at the hospital studied. The researcher would also work with the volunteer group to identify any problems that they had in understanding the survey.

Management Interviews. The second data collection method involves individual interviews to determine the degree and time of TQM implementation for each department. Meetings with management representatives would consist of a semi-structured interview protocol consistent with the TQM interventions. A tape recording would be made of each interview and the researcher would also write notes during the interview. The average length of each interview is expected to be 45 minutes.

Archival data. Another phase of the data collection process includes a review of archival data kept in the offices of department heads and the offices of Administration and Human Resources. Specific documents include job descriptions, statement of qualifications or specifications, organization charts, lists of employees on strength by department, communication documents such as newsletters, and meeting minutes. A review would be made of any documented customer surveys, focus groups, and measurement instruments. Further, policy manuals would be reviewed for evidence of organizational factors such as formalization and to confirm the TQM interventions implemented such as use of cross-functional problem solving teams. Archival documents obtained would further the understanding of self perceptions indicated in surveys and interviews to provide a more holistic picture of the data collected. These documents would also help to corroborate assertions made in management interviews.

Independent Variables. The survey would be used to determine the perceived level of centralization, complexity, formalization, interconnectedness, and organizational slack for each department. The number of employees per department would be used to measure the size of each
department. Staff count would be obtained from archival records in the Human Resources Department. Although not of theoretical interest for this study, six control variables are established and include gender, supervisory position, years worked at the hospital, prior TQM training, hospital TQM training, and leadership.

The index of complexity is based on responses to three items, namely, highest level of education level, number of different occupational specialties the respondent holds, and the highest level of professional activity. Scales created by Hage and Dewar (1973) and Zmud (1982) were adapted for this index. A frequency response set is used for the remaining scales where a rating of 1 is never; 2 is rarely; 3 is occasionally; 4 is frequently; and 5 is always. The index of centralization is based on the actual participation in decision making as represented by the replies to five items and is also based on the reply to one item that assesses the respondent’s perception of input being reflected in the final decision. Scales created by Hage and Dewar (1973) and Pugh, Hickson, Hinings, and Turner (1968) were adapted for this index. The index of formalization is based on responses to seven items concerning job codification and rules, rule observation, role identification, information passing, and recording of role performance. Scales created by Hage and Dewar (1973) were adapted for this index. The index of organizational slack is based on participants’ perception of their respective department’s ability to purchase innovations, absorb failure, incur the cost of implementing innovations, and explore potential needs as represented by the replies to five items. This section of the survey reflects my understanding of organizational slack from a review of the relevant literature on the subject (Rogers, 1995 and Damanpour, 1991). The index of interconnectedness is based on participant’s perception of their ties to organizations outside their department or immediate work group or unit as represented by the replies to five items. This portion of the survey reflects my understanding

Two composite leadership indexes were created to control for the influence of the CEO, senior leaders, and department heads on the implementation of the innovation. The leadership involvement index reflects the perceived participation rate and enthusiasm and support frequency by non-supervisors of all management levels combined, regarding hospital TQM training. The leadership self-report index shows the self-perceived participation rate and enthusiasm and support frequency for hospital TQM training by senior leaders and department heads.

Aggregation Issues. When analyzing multi-level data, the literature suggests two fallacies can emerge, ecological and individualistic (Van de Ven & Ferry, 1980). Ecological fallacies happen when one incorrectly draws conclusions about individuals from group level data, whereas, individualistic fallacies result from making inferences about a group or organization based on responses from individuals. Specifically, James (1982) states,

“...the term aggregation bias is used in this context to refer to a fallacy of the wrong level, where estimates of perceptual agreement based on aggregates (means) are erroneously interpreted as applying to estimates of agreement based on individuals. Typically, relationships based on aggregates provide inflated estimates of relationships at the individual level of analysis.”

It is this second fallacy or aggregation bias that is of concern to researchers on groups and hence the present study given that the unit of analysis is at the department level based on responses aggregated from individual employees.

There are essentially three strategies that can be employed to determine the suitability for scale aggregation. First, as the literature suggests (Van de Ven & Ferry, 1980), there must be conceptual clarity and interest expressed about the level of analysis with which the researcher is working. This is done in two ways in the proposed study. First, the very nature of the variables is
at the group level. For instance, formalization refers to the written rules and procedures of the department. It would be illogical to conclude that the level of formalization refers to an individual. This is noted in James (1982) who gives an example of this fundamental thinking from Roberts et al (1978), “…the unit of theory for organizational characteristics such as size, structure, and technology is the organization, and the appropriate unit to select for observation is the organization.” Secondly, the orientation of the survey items in this study is towards the department. For instance, an item to assess formalization could be, “How often are written job descriptions available to people in your department?” The reference is to all people in the department not only to the individual completing the survey.

The second popular strategy is to demonstrate that between group variance is greater than within group variance by calculating intraclass correlation coefficients (ICC). A positive ICC indicates that group members are more similar than nongroup members, whereas a negative correlation points to the opposite. Intraclass correlation coefficients, measuring the extent to which hospital department employees’ responses agree with each other and differ from other departments, are calculated for all group-level variables or organizational factors in the survey.

For the ICC procedure, the researcher would follow Shrout & Fleiss (1979). The ICC formula assumes that the same number of persons is in each group; however, this study would likely include groups of varying sizes. Therefore, the researcher would calculate N, or the number of persons for this formula, according to Kenny & La Voie (1985).

Despite the foregoing, it is likely that the overall intraclass correlations would be very low for this study as James, Demaree, and Wolf (1984) note that it is very difficult to achieve a high ICC because to do so requires both low within-unit variance and high between-unit variance. When a low ICC is determined, it is impossible to discover if it is due to reliable
differences among raters, interactions between the measure and the raters, random error, or some combination of these factors (James, 1982). Further, Myers (1972) recommends that researchers apply a more generous criterion when evaluating the significance of group-level effects. He suggests using an alpha level of .25, rather than the conventional .05 that this study would use.

Because intraclass correlation coefficients may yield artificially low estimates of agreement, James, Demaree, and Wolf (1984) suggest an estimate of within group interrater reliability as an alternative. It is a measure called interrater reliability (IRR) and for multiple-item variables, compares the mean item variance to the expected variance estimate and adjusts both numerator and denominator by the number of items. Given the aforementioned shortcomings of ICC as an index of interrater reliability, the low coefficients likely to be achieved, and the potential systemic limits to large between group variance as all cases in this study come from the same organization, the researcher would calculate IRR coefficients using the James et al (1984) formula. This third strategy to determine the suitability for aggregation is a manual process that could easily require over 400 hand calculations as the formula must be applied to each variable for each department. For example, a study of a hospital with 25 departments using 18 variables requires 450 hand calculations.

George & Bettenhausen (1990) refer to an IRR coefficient of .70 or above as a “good” amount of within-group interrater agreement. According to Kozlowski & Hattrup (1992), who offer a response to the methodological critique for $r_{wG(I)}$, this is a suitable index of agreement for small samples when the IRR coefficients are high. This index would be appropriate in this study given the smaller size of hospital departments. In sum, these statistics suggest helpful guidelines when determining if the organizational factors; complexity, centralization, formalization,
interconnectedness, and organizational slack can be considered department-level variables and thus that aggregation is justified.

Configurational Analysis

Interchangeable use of terms typology and taxonomy lead researchers Doty and Glick (1994) to delineate their differences primarily based on typology’s conceptual derivation and taxonomy’s empirical derivation. Mills and Margulies (1980) further sub-divide organizational typologies into grand typologies and mid-range typologies. While these apparently mutually exclusive characterizations promote fodder for intellectual debate; Meyer, Tsui, and Hinings (1993; p. 1184) believe that the dichotomy is largely artificial and diversionary as both “typology and taxonomy are equally valuable, complementary approaches to representing organizational configurations.” Meyer et al (1993; p. 1175) use the term “organizational configuration” to mean “any multidimensional constellation of conceptually distinct characteristics that commonly occur together.” Therefore, configurational analysis is a more inclusive approach to characterizing attributes, such as organizational factors used in this hospital study, to determine coherent patterns. This is the approach that I recommend for data collection in this study.

Four adopter types or classes of adoption can be delineated for the purpose of developing a configuration of TQM adopters on the basis of degree and time of implementation. A non-adopter is simply a department that has not implemented any of the five TQM interventions either prior to or since the hospital’s pseudo TQM program start date of February 1999. A prior adopter implemented all of their interventions prior to February 1999. A partial current adopter implemented some TQM interventions before and some after February 1999. Lastly, a current adopter implemented all of their interventions after February 1999.
This delineation allows analysis and understanding of the specific impact that the predictor variables have on the most current level of adoption. It is really the core outcome for the study given that I am primarily interested in the impact of the organizational structure’s internal characteristics on the implementation of TQM since the current program started.

A two-by-two matrix is presented in Figure 1 of the implementation time and implementation degree for adopter departments. Non-adopter departments would not be recorded in the matrix given that the concern is to uncover the departments who implemented more of the TQM program and in less time than other departments. Points of demarcation in the grid reflect the respective average percentage per department for each of degree (X %) and time (Y days) of implementation. For example, quadrant I would reflect the departments that were rated as having a high degree of implementation (>X %) and an early time of implementation (<Y days).

Insert Figure 1 about here

Qualitative Analysis

Non-supervisory interviews. The researcher would capture qualitative data through the use of a semi-structured interview format for the non-supervisory employees. The instrument is intended to provide further information regarding the study’s independent variables except size. Insight would be gained with this vehicle to better understand the survey results after the data collection. Non-supervisory employees would be interviewed after they complete the employee survey. The average length of each interview telephone would be 30 minutes. A tape recording would be made of the interviews with original notes taken during the interview. A transcription of respondent dialogue recorded on the tapes would be performed.
Sampling. Two sub samples are suggested for this qualitative part of the study to permit comparison, namely, those employees who were not yet TQM trained at the hospital since the hospital training began and those who have received the TQM training. The benchmark start date of the hospital TQM program, would serve as the point of demarcation for the two subsamples. Given how the population is established and the data is to be collected, one can conclude that a convenience sample is used for this part of the research.

The selection criteria for the two subsamples are that the employee is a non-supervisor, signed the consent form, completed the survey, and worked at the hospital since the TQM program’s start date. The only difference in criteria among respondents is being untrained or trained. However, respondents may or may not have received TQM training previously at the hospital or at another organization. In either case, this would not affect their categorization as untrained or trained. This is because the researcher is focusing only on the effect of the most recent TQM training at the hospital. Non-supervisors would be used simply because the researcher would have already conducted interviews with department heads to assess the dependent variable and so a view of organizational life from a different group of employees would be desired. This would also control for any variance that may result from being in a supervisory position.

Thematic analysis and code development. Boyatzis (1998:vi) describes thematic analysis as a rigorous “process for encoding qualitative information.” The process starts with identifying the phenomenon of interest and determining the unit of analysis, as described earlier for this inductive study which includes the participant responses to the interview questions. Next, the researcher for this study collects the data often through taped interviews. After the transcriptions of tape-recorded interviews, data reduction outlines are created. Boyatzis (1998: 69) informs that
the objectives of reducing the raw information “are to understand the raw information, internalize as much of it as possible... and reduce it to a manageable size.”

General themes emerging from the data reduction outlines for both untrained and TQM trained employee participants are created next. The concern here is to identify the start of themes or patterns among the respondents’ remarks. These themes are rewritten to remove redundancies and combine similar statements into potentially differentiating themes. Comparing themes across sub samples yields themes that discriminate TQM trained from untrained participants. These themes were determined on the basis of occurring in conversations of at least three TQM trained participants and occurring in less than three untrained participants.

The themes are again rewritten to clearly articulate thematic codes. The subsequent codebook includes the following categories for each code: label, definition, example, indicators and exclusions (where appropriate). In order to test the codes, the researcher goes back into the raw data of interview notes to determine the frequency of expression or the number of times the expression is demonstrated per participant during the interview. This exercise confirms the ability of the codes to discriminate between those who did and did not take the TQM training.

RECOMMENDATIONS FOR FUTURE RESEARCH

This research design attempted to lay the groundwork for empirically determining the optimal configuration of organizational factors to facilitate the implementation of an administrative innovation, Total Quality Management. The intent was to develop a model of internal organizational characteristics that explains variations in both the degree and time of TQM adoption in the context of a health care setting. Then the task was to categorize the resulting configuration as a mechanistic, organic, or hybrid design. Empirical research would likely indicate that some of the specified variables are important in explaining the
implementation behaviors of hospital departments and that others may not be important. A close look at such findings would reveal insights into the relationship between each of these factors and TQM implementation.

The suggested configurational analysis in Figure 1 can be statistically validated in future studies. The framework provides a useful starting point for addressing new questions in innovation implementation research. A quadrant-by-quadrant analysis seems appropriate as a catalyst to generate provocative inquiries.

For quadrant III, there are questions such as why do organizations fail to adopt an innovation like TQM completely despite being quick to initiate it? Given that partial adoption may not be as effective as full implementation, research aimed at understanding the impediments to complete implementation will be meaningful. Similarly, what stymied the late and low level adopters in quadrant IV from full implementation? Quadrant IV will likely hold the largest number of current adopter departments and therefore have the greatest potential for change. What is it about quadrant I departments, who more fully implement an innovation, that also allows them to implement faster than quadrant II departments who are also high degree implementers? A better understanding of the critical structural characteristics and their configuration to stimulate innovation implementation behavior will be instrumental to the success of any organization’s innovation management program.
References


FIGURE 1 IMPLEMENTATION MATRIX FOR ADOPTER DEPARTMENTS

Time of Implementation
(Y Days based upon average number of days per department)

Early
<Y Days

Late
>Y Days

QUADRANT III
QUADRANT I

QUADRANT IV
QUADRANT II

Low
<X%  High
>Y%  

Degree of Implementation
(X% based upon average percentage per department)